DOCUMENT RESUME

ED 045 830 VT 012 173

TITLE	Health Resources Statistics; Health Manpower and Health Facilities, 1969.
INSTITUTION	National Center for Health Statistics (DHEW), Rockville, Md.
REPORT NO	PHS-Pub-1509
PUB DATE	May 70
NOTE	272p.
AVAILABLE FROM	Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402 (HF20.2215:969, $2.75)
EDRS PRICE	EDRS Price MF-$1.25 HC Not Available from EDRS.
DESCRIPTORS	*Health Facilities, *Health Occupations, *Manpower Utilization, *National Surveys, *Program Administration, Program Evaluation, Program Planning

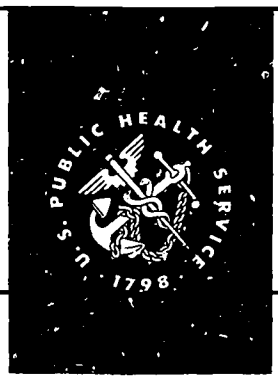
ABSTRACT

Intended to provide current statistics on health manpower and inpatient health facilities for the evaluation, planning, and administration of health programs, data were gathered from college and university records, state licensing records, association membership records, and agencies and establishments that provide health services. About 3.7 million persons were employed in 1968 in 34 health professions and occupational areas identified in this publication. Nursing and related services were the largest category of employed persons, followed by medicine and osteopathy, secretarial and office services, and dentistry and allied services. There were an estimated 31,000 inpatient health facilities in the United States, with 63 percent nursing care and related homes, 26 percent hospitals, and 11 percent sheltered care facilities. This represents an estimated increase of 3,800 inpatient health facilities or 14 percent since 1963. These and other data are provided in textual and tabular form. A list of health occupations is appended, and a subject index is included. (SB)

Health Resources Statistics

REPORTED FROM THE NATIONAL CENTER FOR HEALTH STATISTICS

U.S. DEPARTMENT OF
HEALTH, EDUCATION, & WELFARE
PUBLIC HEALTH SERVICE
HEALTH SERVICES & MENTAL HEALTH ADMINISTRATION



PUBLIC HEALTH SERVICE PUBLICATION NO. 1509, 1969 EDITION

Library of Congress Catalog Card Number 66-62580

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ROCKVILLE, MD. 20852
MAY 1970

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Library of Congress Catalog Card Number 66-62580

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FOREWORD

This report is the third of an annual series on health manpower and facilities published by the National Center for Health Statistics. *Health Resources Statistics: Health Manpower and Health Facilities, 1969* is intended to provide current statistics on a wide range of health areas as baseline data for the evaluation, planning, and administration of health programs. Additional detail may be obtained by referring to the sources and published and unpublished materials cited in the individual chapters.

We should like to extend our appreciation to each of the many associations, organizations, Government agencies, and individuals contributing to the publication by providing materials and suggestions for the text and tables.

This edition of *Health Resources Statistics* was prepared and compiled under the direction of *Sheldon Starr*, Staff Assistant, Division of Health Resources Statistics of the National Center for Health Statistics.

SIEGFRIED A. HOERMANN,
Director,
Division of Health Resources Statistics

This edition of HEALTH RESOURCES STATISTICS, 1969 contains data on health manpower and inpatient health facilities. Subsequent editions will also include statistics on outpatient health facilities and other resources in the health field.

PUBLIC HEALTH SERVICE PUBLICATION NO. 1509
1969 EDITION

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PART II—INPATIENT HEALTH FACILITIES

SYMBOLS

Data not available	---
Category not applicable	...
Quantity zero	—
Quantity more than 0 but less than 0.05	0.0

PART I

Health Manpower

INTRODUCTION

About 3.7 million persons were employed in 1968 in the health professions and occupations identified in this publication (table 1). A total of about 375 primary and alternate job titles are listed in the appendix. Even then, the inventory is incomplete and some types of health workers may have been inadvertently omitted.

Persons who work in these specific health professions and occupations have had special education or training designed to help them function in a health setting. Many other persons perform the business, clerical, and maintenance services essential to the operation of health facilities and agencies, but their occupations are not unique to the health field. (See table 2 and ch. 1.)

It is difficult to determine the number of individuals in each of the health occupations, yet it is desirable to know the total number of persons who have had special education or training and, of this number, the proportion that is in the work force. Information is needed on geographic location; employment status and type of activity; educational background and special training; personal characteristics such as age, race, and sex; and employment characteristics related to the kind and volume of services rendered and the number of years of work experience.

Information on health manpower classified by occupation is shown in the chapters that follow. Manpower statistics discussed in this part are related to education, license to practice, certification or registration, association membership, place of employment, and other factors.

Education

A *graduate* or *professional* degree awarded by an educational institution in the United States is positive identification for many professions. The doctorate is usually required for scientists in medical research; the master's degree, for social workers; and a master's degree in public health, for public health educators or nutritionists. Professional degrees clearly identify the physician (M.D. or D.O.), the optometrist (O.D.), the dentist (D.D.S. or D.M.D.), the veterinarian (D.V.M. or V.M.D.), and so forth.

Each educational institution maintains a list of the individuals who have been graduated and their levels of degree. The National Center for Educational Statistics compiles statistics on the annual numbers of graduates as reported by schools, colleges, and universities. The 1966–67 data on degrees conferred in fields pertinent to health are shown in table 3 (*1*). The American Public Health Association compiles statistics on the annual numbers of graduates of schools of public health, including the professional categories of the degree recipients (tables 4, 5, and 6).

A file of all graduates in a given field may be compiled from the lists of those persons who have completed approved academic programs. For example, the Association of American Medical Colleges maintains such a file on graduates of U.S. medical schools, by school and year of graduation. The American Association of Colleges of Pharmacy can also identify graduates of its institutions.

The names of all graduates of U.S. schools who have been awarded an M.D. degree are included in the records maintained by the American Medical Association; those with a D.O. degree, by the American Osteopathic Association; those with a D.M.V., by the American Veterinary Medical Association; and those with a D.D.S. or D.M.D., by the American Dental Association. Thus, these associations represent all individuals in the profession, rather than only their members. It is difficult, however, for associations to maintain current information about persons who do not belong to the organization and who will not reply to periodic requests for data on place of employment and type of activity.

Persons with a *baccalaureate* as the highest educational level are not so easy to identify as those with a graduate or professional degree.

Occupational therapists, physical therapists, statisticians, and sanitarians are among those whose educational requirement is a bachelor's degree or higher. The educational program may be offered in the form of courses, as a separate department, or as a separate school. Sometimes the persons are reported as graduates when they have completed their academic work, but a period of supervised clinical practice may be required for professional recognition. This is the situation, for example, for occupational therapists.

Below the baccalaureate level but still in an educational setting are the increasing numbers of persons enrolled in community colleges and vocational schools. A 2-year course leads to an associate degree or certificate for registered nurses and for dental hygienists. A 1-or 1½-year course is the usual program for practical nurses.

Manpower information on persons who have received *on-the-job training* can only be obtained by surveys or censuses of the general population or by surveys of the kinds of establishments in which they work. On-the-job training is usual for dental assistants and dental laboratory technicians who have completed their high school education prior to receiving inservice training; however, formal education programs have been developed in both areas.

Persons who have been educated outside of the United States and have later come to this country for additional training or for employment are hard to locate. Increasing numbers of *foreign-trained* physicians and nurses are entering this country; to know how long they stay or when they leave is difficult. State licenses, required for employment, are not required for certain types of training even though the individuals provide patient care while in the training programs.

License or Permit

A license or permit to practice within a State, issued by a State agency, is a means of identifying some health personnel. For example, this is the best source of statistics on registered nurses (R.N.) and on practical nurses (L.P.N. or L.V.N.).

About 26 occupations in the health field are licensed in one or more States. All States and the District of Columbia require that the following health personnel have a license to practice: dental hygienists, dentists, environmental health engineers, optometrists, pharmacists, physicians (M.D. and D.O.), podiatrists, practical nurses, registered nurses, and veterinarians. All except two States license chiropractors and physical therapists; 40 States license psychologists; 32, sanitarians or sanitary inspectors; 23, midwives, and 16 States license opticians. Fewer than one-third of the States license clinical laboratory directors including bioanalysts, clinical laboratory personnel such as medical technologists or technicians, naturopaths and other drugless healers, and social workers. Physical therapy assistants are licensed in 7 States. A total of 20 States have laws providing for the licensing of nursing home administrators. Radiologic technologists (X-ray technicians) are licensed or certified in 3 States; hospital administrators are licensed in 2 States; and health department administrators are licensed in 1 State.

The Council of State Governments, under contract with the National Center for Health Statistics, conducted a survey in 1966 on policies and practices of the State licensing agencies. The survey provides information on licensing qualifications, reciprocity, and other related matters, as well as the numbers of licenses in effect. The findings have been compiled and published by the National Center for Health Statistics (*2*).

A 1968 Inventory of Registered Nurses, conducted by the American Nurses' Association and financed by the Public Health Service, provides information on the number of registered nurses in the country who maintain their license to practice (*3*). A recently completed study conducted by the National Association of Boards of Pharmacy under contract to the NCHS provides similar information for pharmacists (*4*).

Current studies are underway of several types of licensed personnel, including dental hygienists, practical nurses, ophthalmologists, optometrists, and dispensing opticians. These surveys are being conducted or financed by the Public Health Service. Basic data, such as place of employment, type of activity, specialization, educational preparation, year of birth, and sex, will be obtained in the surveys.

The information thus provided is relatively complete for all persons active at the time of renewal of the license to practice. However, it must be taken into account that for some occupations there is considerable variation in qualifications from one State to another, and the spread in renewal dates adds confusion to the elimination of duplicates licensed in more than one jurisdiction.

Certification or Registration

Within some professions there are specialty boards, certification boards, and/or registries established by the profession itself for the purpose of distinguishing quality. Persons who meet certain requirements of education, experience and competency, and pass an examination given by the board may use specific professional designations. For example, MT (ASCP) indicates that the medical technologist has been registered by the Board of Registry of Medical Technologists of the American Society of Clinical Pathologists.

These organizations not only qualify persons who meet their standards but they usually know of persons working toward qualification. They maintain lists of all persons registered to date. The lists may appear in published form, as in *The Directory of Medical Specialists* (*5*), which provides information on all physicians who are diplomates of the 20 American Specialty Boards.

Association Membership

To become a member of a professional association or society implies having met certain qualifications of education and/or experience. Associations usually maintain records on current and past members (who may decide to reactivate their membership at a later date). Their mailing lists provide information on geographic location (as in the case of the American Dietetic Association and the American Physical Therapy Association). Sometimes information on employment status and other items obtained at the time of renewal of membership is included (as in the case of the American Speech and Hearing Association). Membership lists may be published for general distribution or limited to paid members.

Association memberships may represent nearly all persons in the specific health field (as in the case of the American Occupational Therapy Association) or only a small portion of those carrying the job title (as in the case of the American Society of Radiologic Technologists). In the latter instance, persons who could qualify for membership do not choose to belong, for various reasons, while many others working in the field do not have the qualifications essential for membership.

Mailing lists including both members and nonmembers are circularized by selected professional associations in connection with the National Register of Scientific and Technical Personnel, a responsibility of the National Science Foundation. The seventh biennial registration of scientists conducted in 1968 included physical scientists in the fields of chemistry, earth and marine sciences, atmospheric and space sciences, physics, mathematics and computer sciences, life scientists in the fields of agriculture and biology, as well as scientists in psychology, statistics, economics, sociology, anthropology, linguistics, and political science. Nearly 298,000 individuals responded with data about field of science, highest degree, age, type of employer, work activity, years of professional experience, and salary. The 111,000 doctorates are estimated to be about 90 percent of the Nation's science doctorates (*6*).

Sources of Data

Agencies and establishments that provide health services are another source of manpower statistics. Examples are the occupational classification of persons employed by the Federal government (tables 7 and 8) and by State and local health departments (table 9).

The U.S. Department of Labor, Bureau of Labor Statistics, has published information on numbers of health personnel and other types of employees in the surveys of scientific and technical personnel employed by State governments in 1964 and by local governments in 1963 (*7*). This study was repeated in 1967 and a report is expected to be published early in 1970 (table 10).

A survey of manpower resources in hospitals, conducted by the American Hospital Association (AHA) and financed by the Public Health Service (PHS), provides information on the numbers of full- and part-time employees in hospitals in April 1966 for about 35 categories (*8*). Summary tabulations of personnel in hospitals are shown in table 11. The survey was repeated in 1969 and preliminary data are expected early in 1970. Findings from a survey of manpower resources in nursing and personal care facilities, conducted by the PHS, National Center for Health Statistics, are presented in table 12.

The National Center for Health Statistics conducts nationwide surveys of nursing homes, homes for the aged, and other establishments providing nursing, personal, and domiciliary care to the aged and infirm. Comprehensive and current statistics on staffing of these facilities are reported in Vital

and Health Statistics, Series 12 of the Center's publications.

The National Institute of Mental Health conducted a 1963 survey of professional personnel employed in mental health establishments. The findings on staffing by psychiatrists, psychologists, psychiatric social workers, and psychiatric nurses appear in the series of *Mental Health Manpower* current statistical and activities reports, begun during the period January–March 1964 and completed in April 1966.

In connection with the comprehensive program of health insurance for the aged (Medicare), the Social Security Administration will publish a report during 1970 on medical and paramedical manpower staffing in facilities participating in this program.

The Division of Nursing, Bureau of Health Professions Education and Manpower Training is updating material on the number, distribution, and characteristics of nursing personnel (*9*).

The 1960 *Census of Population* provides statistics on occupation by industry for employed persons. The statistics are based on a 5 percent sample of the population (*10*). Special tabulations compiled by the Bureau of the Census have been published by the Public Health Service (*11*). The summary table for the Nation as a whole is reproduced here as table 2, to show the many diverse occupations within the health services industry.

Commercial "mailing" houses compile names and addresses of individuals from a wide variety of sources, including those available from associations or State registrations. They sell their lists or provide mailing services. Other sources of identification of health personnel include occupational listings in telephone books and city directories.

Public Health Personnel

Tables on public health personnel and on employees of government health departments have been included in the introduction, rather than in a separate chapter. Public health, while often treated as an independent activity within the health field, utilizes most of the individual types of health manpower described elsewhere in this publication.

Reliability of Estimates

The estimates of existing manpower resources cited in the chapters to follow differ widely in reliability. Where data are based on surveys, the estimate should be fairly reliable. Other estimates are the best available, but may be off by as much as 50 percent. To some extent the relative accuracy of the data can be determined by the context in which the figures are introduced. Furthermore, in the case of some health occupations, it will be clear that the data are incomplete, and it is likely that there is a direct correlation between the amount of data available and the reliability. As the "state of the arts" improves, both the amount and quality of statistics will increase.

The following guidelines may also be of value in judging reliability:

1. The greatest reliability can be expected for those occupations for which a graduate or professional degree provides positive identification. If this circumstance applies and there is also an accounting system established to identify graduates, introduce immigrants to the profession from overseas, eliminate deaths from the file, and periodically survey all or samples of the list to learn about current activity, then the statistics are likely to be highly reliable.

2. The statistics on numbers of graduates with specific advanced degrees are probably more reliable than the numbers active in the profession or occupation.

3. Where no more than the bachelor's degree is required for entrance into the field, the data are apt to be less reliable. Where the necessary training is below the baccalaureate level, then even less confidence can be placed in the figures coming from educational sources.

4. If the data on numbers in the health occupation come from licensure information, the statistics are probably of a reasonably high dependability. However, much will depend upon completeness of coverage, uniformity of licensing practices, and success in eliminating duplications between jurisdictions.

5. Statistics from specialty boards, certification boards, and registries may be entirely accurate counts of persons deemed to meet the requirements of listing. They obviously are not intended to cover the profession completely and may represent only a minority working in the specialized field.

6. Association membership used alone as a guide to manpower resources should be treated with

very great caution, although such a generalization is subject to exceptions. Some associations are quite successful in bringing in a high proportion of all workers in the field. Others are weak or in competition with other associations.

7. Surveys of establishments are capable of producing highly reliable results for persons working in those establishments, but there are problems of obtaining complete coverage of the establishments. Each survey must be judged on its merits. It is clear, however, that such surveys miss some people with the appropriate training who are not currently employed.

8. The same remarks apply to statistics on occupation from previous censuses of the population. Here there have been the additional problems that household respondents' reports and coding practices have made it difficult to sort out properly the detailed categories of health personnel that are of interest.

The chapters that follow indicate the best estimates known to the Public Health Service, though it is acknowledged that in some instances these are little better than informed guesses. It will be the task of the National Center for Health Statistics, working with other agencies and professional associations, to update and improve upon the estimates that will be found herein.

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Table 1. ESTIMATED PERSONS EMPLOYED IN SELECTED OCCUPATIONS WITHIN EACH HEALTH FIELD: 1968

Health field and occupation	Workers
Total [1]	3,639,650 to 3,706,350
Administration of health services	39,000 to 45,000
Administrator, program representative, management officer	39,000 to 45,000
Anthropology and sociology	1,400
Anthropologist—cultural and physical	600
Sociologist—medical	800
Automatic data processing in the health field	700 to 1,000
Systems analyst	700 to 1,000
Basic sciences in the health field	51,200
Research scientist (other than physician, dentist, veterinarian)	51,200
Biomedical engineering	9,000
Biomedical engineer	[2] 3,000
Biomedical engineering technician	[2] 6,000
Chiropractic and naturopathy	16,000 to 18,000
Chiropractor, naturopath, other drugless healer	16,000 to 18,000
Clinical laboratory services	108,000
Clinical laboratory scientist	4,000
Clinical (medical) laboratory technologist [3]	43,000
Clinical laboratory technician and assistant	61,000
Dentistry and allied services	237,000
Dentist	[4,5] 100,000
Dental hygienist	[2] 15,000
Dental assistant	[2] 95,000
Dental laboratory technician	[2] 27,000
Dietetic and nutritional services	36,000
Dietitian and nutritionist	[6] 30,000
Dietary technician, food service supervisor	[6] 6,000
Economic research in the health field	500 to 600
Economist—health	[2] 500 to 600
Environmental control	217,500
Environmental engineer	13,500
Scientist	11,000
Sanitarian	[7] 12,000
Industrial hygienist	1,600
Other environmental protection program specialists	16,400
Technicians and aides	163,000
Food and drug protective services	23,400
Food technologist	22,000
Food and drug analyst and inspector	1,400

See footnotes at end of table.

Table 1. ESTIMATED PERSONS EMPLOYED IN SELECTED OCCUPATIONS WITHIN EACH HEALTH FIELD: 1968—Continued

Health field and occupation	Workers
Health and vital statistics	1,500
Health statistician, vital-record registrar, demographer	1,500
Health education	20,000 to 21,000
Public health educator	2,000 to 3,000
School health educator, coordinator	18,000
Health information and communication	4,500 to 5,600
Health information specialist and science writer	2,000 to 3,000
Health technical writer	[6] 2,000
Medical illustrator	500 to 600
Library services in the health field	9,000
Medical librarian	[6] 3,000
Medical library technician and clerk	6,000
Medical records	38,500
Medical record librarian	12,500
Medical record technician	26,000
Medicine and osteopathy	313,000
Physician (M.D.)	[4,5] 301,500
Physician (D.O.)	[4,5] 11,500
Midwifery	4,400
Lay midwife	4,400
Nursing and related services	1,825,000
Registered nurse	680,000
Practical nurse	345,000
Nursing aide, orderly, attendant	786,000
Home health aide	14,000
Occupational therapy	11,200 to 12,200
Occupational therapist	6,700
Occupational therapy technician, assistant	[2] 4,500 to 5,500
Optometry, opticianry, and ocular services	53,450
Optometrist	13,000
Dispensing optician	10,000
Optical technician	[6] 15,000
Ophthalmic assistant	10,000
Orthoptist	450
Orthotic and prosthetic technology	3,600
Orthotist and prosthetist	3,600
Pharmacy	130,100
Pharmacist	124,500
Pharmacy aide	[8] 5,600

See footnotes at end of table.

Table 1. ESTIMATED PERSONS EMPLOYED IN SELECTED OCCUPATIONS WITHIN EACH HEALTH FIELD: 1968—Continued

Health field and occupation	Workers
Physical therapy	19,500 to 21,500
Physical therapist	13,500
Physical therapy technician, assistant	[2] 6,000 to 8,000
Podiatry	8,000
Podiatrist	8,000
Psychology	12,000
Psychologist—clinical, counseling, and other health	12,000
Radiologic technology	75,000 to 100,000
Radiologic (X-ray) technologist, technician, assistant	[2] 75,000 to 100,000
Secretarial and office services in the health field	250,000 to 275,000
Receptionist, secretary, assistant, aide	250,000 to 275,000
Social work	24,200
Social worker—medical and psychiatric	22,700
Social work assistant	[8] 1,500
Specialized rehabilitation services	8,900 to 10,100
Corrective therapist	[2] 1,000 to 1,200
Educational therapist	[6] 500
Manual arts therapist	[6] 900
Music therapist	2,200
Recreational therapist	4,000 to 5,000
Homemaking rehabilitation consultant	300
Speech pathology and audiology	17,000
Speech pathologist and audiologist	17,000
Veterinary medicine	25,000
Veterinarian	[4] 25,000
Vocational rehabilitation counseling	11,100
Vocational rehabilitation counselor	11,100
Miscellaneous health services	35,000 to 37,000
Surgical technical aide	[2] 19,000
Inhalation therapy technician	8,000
Electrocardiograph technician	6,000 to 7,000
Electroencephalograph technician	2,000 to 3,000

[1] Each occupation is counted only once. For example, all physicians are in medicine and osteopathy.
[2] 1967 estimate repeated in absence of sufficient information on which to base revision.
[3] With bachelor's degree or ASCP certified.
[4] Estimate indicates active rather than total.
[5] Preliminary estimate.
[6] 1965 estimate repeated in absence of sufficient information on which to base revision.
[7] Previous editions included a combined estimate for "Sanitarians and Sanitarian Technicians".
[8] Limited to hospital employees in 1966.

Table 2. OCCUPATION OF PERSONS EMPLOYED IN THE CIVILIAN LABOR FORCE: 1960

Detailed occupation [1]	All industries	Health services	Percent health
All occupations	64,646,563	2,589,253	4.0
Professional, technical, and kindred	7,223,241	1,167,218	16.2
Accountants and auditors	469,702	4,077	.9
Chiropractors	13,853	13,630	98.4
Clergymen	199,701	2,275	1.1
Dentists	86,887	85,263	98.1
Dietitians and nutritionists	26,470	18,190	68.7
Engineers, technical	859,547	2,775	.3
Lawyers and judges	208,696	1,696	.8
Librarians	84,332	6,918	8.2
Natural scientists:			
Biological scientists	13,415	4,036	30.1
Chemists	81,120	3,133	3.9
Physicists and other natural scientists	53,650	585	1.1
Nurses, professional	581,289	528,771	91.0
Nurses, student professional	57,746	57,746	100.0
Optometrists	16,205	13,073	80.7
Osteopaths	4,081	3,861	94.6
Personnel and labor relations workers	98,257	4,379	4.5
Pharmacists	92,233	6,504	7.1
Photographers	50,735	1,529	3.0
Physicians and surgeons	229,671	218,301	95.0
Public relations men and publicity writers	30,593	722	2.4
Recreation and group workers	37,487	1,507	4.0
Religious workers	57,069	1,386	2.4
Social and welfare workers, except group	95,103	9,795	10.3
Social scientists:			
Psychologists	11,694	3,522	30.1
Statisticians and actuaries	20,711	743	3.6
Teachers (elementary, secondary, n.e.c.)	1,670,810	3,666	.2
Technicians, medical and dental	138,813	127,947	92.2
Technicians, electrical engineering and other	277,905	1,589	.6
Therapists and healers (n.e.c.)	36,568	25,272	69.1
Veterinarians	15,205	382	2.5
All other	1,603,693	13,945	.9
Managers, officials, and proprietors	7,916,062	50,092	.6
Credit men	46,592	962	2.1
Purchasing agents and buyers (n.e.c.)	103,191	2,262	2.2
All other	7,766,279	46,868	.6
Clerical and kindred workers	9,303,231	399,703	4.3
Agents (n.e.c.)	158,610	1,511	1.0
Attendants, physician's and dentist's office	72,171	70,607	97.8
Bookkeepers	916,453	21,622	2.4
Cashiers	471,878	5,420	1.1
Fileclerks	132,925	4,265	3.2
Messengers and office boys	59,752	2,311	3.9
Office machine operators	304,952	3,119	1.0
Payroll and timekeeping clerks	105,917	1,768	1.7
Receptionists	134,866	55,286	41.0
Secretaries	1,463,731	101,339	6.9

See footnotes at end of table.

Table 2. OCCUPATION OF PERSONS EMPLOYED IN THE CIVILIAN LABOR FORCE: 1960—Con.

Detailed occupation [1]	All industries	Health services	Percent health
Shipping and receiving clerks	278,210	645	.2
Stenographers	269,759	9,289	3.4
Stockclerks and storekeepers	329,661	6,899	2.1
Telephone operators	354,200	14,706	4.2
Typists	521,240	19,337	3.7
All others	3,728,906	81,579	2.2
Salesworkers	**4,643,784**	**1,838**	**0.0**
Craftsmen, foremen, and kindred workers	**8,753,468**	**67,742**	**.8**
Bakers	106,535	2,028	1.9
Carpenters	822,803	4,416	.5
Electricians	335,053	3,280	1.0
Foremen (n.e.c.)	1,174,314	3,709	.3
Inspectors (n.e.c.)	100,574	5,340	5.3
Mechanics and repairmen	2,221,844	25,810	1.2
Opticians, and lens grinders and polishers	20,406	1,772	8.7
Painters, construction and maintenance	376,022	5,796	1.5
Plumbers and pipe fitters	306,567	2,885	.9
Stationary engineers	267,415	9,650	3.6
All other	3,017,935	3,056	.1
Operatives and kindred workers	**11,920,442**	**62,441**	**0.5**
Deliverymen and routemen	422,622	826	.2
Dressmakers and seamstresses, except factory	119,965	5,574	4.6
Laundry and drycleaning operatives	385,064	32,315	8.4
Meatcutters, except slaughter and packing	180,302	1,479	.8
Photographic process workers	40,747	509	1.2
Stationary firemen	88,314	5,726	6.5
Taxicab drivers and chauffeurs	162,881	2,331	1.4
Truck and tractor drivers	1,555,793	2,658	.2
All other	8,964.754	11,023	.1
Service workers, including household	**7,171,837**	**799,887**	**11.2**
Attendants, hospital and other institution	391,136	365,690	93.5
Attendants, professional and personal service	70,520	2,156	3.1
Barbers	179,670	1,190	.7
Chambermaids and maids	167,913	34,557	20.6
Charwomen and cleaners	182,279	21,846	12.0
Cooks, except private household	563,932	47,234	8.4
Counter and fountain workers	157,415	10,828	6.9
Elevator operators	73,500	5,388	7.3
Hairdressers and cosmetologists	305,858	1,366	.4
Housekeepers and stewards	146,644	29,845	20.4
Janitors and sextons	596,052	26,156	4.4
Kitchen workers (n.e.c.)	300,977	66,655	22.1
Midwives	896	896	100.0
Porters	142,718	12,219	8.6
Practical nurses	207,966	144,045	69.3
Protective service workers	688,256	6,604	1.0
Waiters and waitresses	823,864	11,549	1.4
All other	2,172,241	11,663	.5

See footnotes at end of table.

Table 2. OCCUPATION OF PERSONS EMPLOYED IN THE CIVILIAN LABOR FORCE: 1960—Con.

Detailed occupation [1]	All industries	Health services	Percent health
Laborers	4,532,950	12,172	.3
Gardeners, except farm, and groundskeepers	195,092	3,109	1.6
All other	4,337,858	9,063	.2
Occupation not reported	3,181,548	28,160	.9

[1] Includes only those occupations which have at least 500 persons employed in the health services industry.

Source: Divisions of Public Health Methods, Dental Public Health and Resources, and Nursing: Manpower in the 1960's. *Health Manpower Source Book 18.* PHS Pub. No. 263, Sec. 18. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1964. Based on 1960 Census of Population, 5 percent sample.

Table 3. EARNED DEGREES CONFERRED BY SELECTED FIELD OF STUDY AND LEVEL OF DEGREE, FOR 1,565 INSTITUTIONS: JULY 1, 1966 THROUGH JUNE 30, 1967

Major field of study [1]	Bachelor's degree	First professional requiring 6 years or more	Master's degree	Doctor's degree
All fields	**562,369**	**32,493**	**157,892**	**20,621**
Agriculture	**6,258**	**—**	**1,463**	**564**
Food science	214	—	149	52
Architecture	**2,734**	**133**	**443**	**8**
City planning	**70**	**—**	**369**	**10**
Biological sciences	**28,950**	**43**	**5,003**	**2,256**
Premedical, predental, and preveterinary sciences	3,108	43	15	1
Biology, general	18,097	—	1,887	262
Botany, general	542	—	360	171
Zoology, general	4,353	—	747	271
Anatomy and histology	60	—	108	82
Bacteriology, virology, mycology, parasitology, microbiology	1,108	—	477	289
Biochemistry	262	—	257	3[illegible]
Biophysics	44	—	36	58
Cytology	—	—	3	[illegible]
Ecology	12	—	6	1
Embryology	2	—	1	5
Entomology	206	—	223	144
Genetics	48	—	79	87
Nutrition	39	—	104	34
Optometry (preprofessional)	366	—	—	—
Pathology	—	—	53	39
Pharmacology	—	—	83	93
Physiology	136	—	141	139
Plant pathology	23	—	108	90
Plant physiology	10	—	29	25
Biological sciences, field of study not identified	534	—	286	131
Business and commerce	**69,687**	**—**	**14,894**	**437**
Computer science and systems analysis	**222**	**—**	**449**	**38**
Education	**120,874**	**5**	**55,861**	**3,529**
Health education, separate curriculum	442	—	229	9
Education of the partially sighted	22	—	11	—
Education of the blind	24	—	47	1
Education of the mentally retarded	1,054	—	784	12
Education of the emotionally disturbed	129	—	175	9
Education of the deaf	134	—	147	1
Speech and hearing	2,378	—	887	44
Education of the crippled	78	—	42	—
Education of exceptional children	558	—	1,089	65
Home economics education	4,582	—	509	12
Rehabilitation counselor training	—	—	250	8
Engineering	**36,186**	**2**	**13,885**	**2,614**
Environmental health and sanitary engineering	17	—	178	28
English and journalism	**45,949**	**—**	**7,984**	**871**
Fine and applied arts	**21,553**	**16**	**5,812**	**504**
Folklore	**3**	**—**	**19**	**4**
Foreign languages and literature	**17,025**	**—**	**4,255**	**578**
Forestry	**1,607**	**24**	**298**	**73**
Geography	**2,163**	**—**	**463**	**79**
Health professions	**16,041**	**13,330**	**3,417**	**250**
Chiropody or podiatry	36	165	—	—
Dental hygiene	317	—	23	—

See footnotes at end of table.

Table 3. EARNED DEGREES CONFERRED BY SELECTED FIELD OF STUDY AND LEVEL OF DEGREE, FOR 1,565 INSTITUTIONS: JULY 1, 1966 THROUGH JUNE 30, 1967—Continued

Major field of study [1]	Bachelor's degree	First professional requiring 6 years or more	Master's degree	Doctor's degree
Dentistry, D.D.S. and D.M.D. only	—	3,375	—	—
Hospital administration	9	19	303	2
Medical technology	2,261	—	20	2
Medicine, M.D. only	—	7,767	—	—
Nursing and/or public health	8,334	—	1,145	1
Occupational therapy	554	—	20	—
Optometry	—	455	22	—
Osteopathy	—	405	—	—
Pharmacy	3,555	202	230	69
Physical therapy, physiotherapy	752	—	54	—
Public health	55	—	865	54
Radiologic technology	12	—	10	—
Veterinary medicine, D.V.M. only	—	942	—	—
Clinical dental sciences	—	—	332	1
Clinical medical sciences	—	—	145	46
Clinical veterinary medical sciences	—	—	76	35
Health professions, field of study not identified	156	—	172	40
Home economics	**6,335**	**—**	**850**	**66**
Foods and nutrition	733	—	121	20
Institution management, institution administration	243	—	22	2
Law (LL.B., J.D., or higher degrees)	**493**	**14,846**	**818**	**27**
Library science	**701**	**—**	**4,489**	**16**
Mathematical subjects	**21,308**	**—**	**5,284**	**832**
Mathematics	21,060	—	4,801	730
Statistics	248	—	483	102
Merchant marine (deck officer only)	**215**	**—**	**—**	**—**
Military, naval, or air force science	**1,716**	**—**	**—**	**—**
Philosophy	**5,420**	**—**	**604**	**249**
Physical sciences	**17,794**	**—**	**5,412**	**3,462**
Chemistry	9,872	—	1,805	1,700
Pharmaceutical chemistry	—	—	26	44
Physics	4,733	—	2,111	1,183
Psychology	**19,496**	**—**	**3,138**	**1,231**
Clinical psychology	14	—	172	104
Counseling psychology	2	—	110	24
Social psychology	121	—	30	36
Rehabilitation counselor training	2	—	77	3
Psychology, all others	19,357	—	2,749	1,064
Records management	**82**	**—**	**38**	**—**
Religion	**4,089**	**4,079**	**2,272**	**312**
Social sciences	**104,756**	**15**	**18,710**	**2,507**
Anthropology	1,825	—	357	136
Economics (excluding agricultural economics)	13,058	—	1,778	546
Sociology	17,751	—	1,193	327
Social work, social administration, social welfare	1,881	—	4,220	64
Trade and industrial training	**2,741**	**—**	**107**	**5**
Board general curriculums and miscellaneous fields	**7,901**	**—**	**1,555**	**99**

[1] All fields listed in the OE publication are shown here, as well as all subfields for biological sciences, health professions, mathematical subjects, and psychology. Other subfields have been selected as being pertinent to health.

Source: National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part A—Summary Data, 1966–67.* OE-54013-67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Data for United States, Guam, and Puerto Rico.

Table 4. DEGREES IN PUBLIC HEALTH AWARDED BY SCHOOLS OF PUBLIC HEALTH: 1960-61 THROUGH 1967-68[1]

Academic year	Total	Bachelor's	Master's	Doctor's	Academic year	Total	Bachelor's	Master's	Doctor's
1967–68	1,349	[2] 51	1,207	91	1963–64	988	119	808	61
1966–67	----------	----------	975	71	1962–63	906	137	740	29
1965–66	1,151	[2] 72	998	81	1961–62	663	87	547	29
1964–65	1,140	110	978	52	1960–61	691	99	565	27

[1] Data for United States and Puerto Rico, prior to the academic year 1962–63 excludes the University of Puerto Rico.
[2] Data from the individual schools.

Sources: Troupin, J. L.: *Schools of Public Health in the United States and Canada, for the Year Ending June 1968.* New York. American Public Health Association (mimeo). Ninth annual report.
U.S. Department of Health, Education, and Welfare, Public Health Service: *Third National Conference on Public Health Training, August 16–18, 1967, Report to the Surgeon General.* PHS Pub. No. 1728. Washington. U.S. Government Printing Office, 1967.

Table 5. LOCATION AND OWNERSHIP OF SCHOOLS OF PUBLIC HEALTH AND NUMBER OF GRADUATES: 1967-68

Location	School	Ownership	Graduates		
			Bachelor's degree	Master's degree	Doctor's degree
	Total, 15 schools [1]	----------	[2] 51	1,207	91
Calif	Loma Linda University, Loma Linda	Private	—	17	—
	University of California, Berkeley	Public	2	120	4
	University of California, Los Angeles	do	22	112	10
Conn	Yale University, New Haven	Private	—	44	1
Hawaii	University of Hawaii, Honolulu	Public	—	28	—
La	Tulane University, New Orleans	Private	—	48	2
Md	Johns Hopkins University, Baltimore	do	—	88	23
Mass	Harvard University, Boston	do	—	85	12
Mich	University of Michigan, Ann Arbor	Public	—	168	3
Minn	University of Minnesota, Minneapolis	do	—	96	7
N.Y	Columbia University, New York	Private	—	97	1
N.C	University of North Carolina, Chapel Hill	Public	1	162	14
Okla	University of Oklahoma, Norman	do	—	4	6
Pa	University of Pittsburgh, Pittsburgh	Private	—	62	8
P.R	University of Puerto Rico, San Juan	Public	26	76	—

[1] Excludes 2 schools in Canada that awarded 77 Master's and 1 Doctor's degree.
[2] Data from the individual schools.

Source: Troupin, J. L.: *Schools of Public Health in the United States and Canada, for the Year Ending June 1968.* New York. American Public Health Association (mimeo). Ninth annual report.

Table 6. PROFESSIONAL CATEGORY OF GRADUATES OF SCHOOLS OF PUBLIC HEALTH, BY GEOGRAPHIC SOURCE AND RECEIPT OF U.S. PUBLIC HEALTH SERVICE TRAINEESHIPS: 1967-68

Professional category	Total	Geographic source			Recipients of U.S. PHS traineeships
		U.S.A.	Canada	Other	
Total	[1] 1,376	[2] 1,077	80	219	[3] 677
Physicians	351	211	23	117	117
Educators, health educators	111	92	4	15	55
Nurses	173	150	12	11	111
Administrators	147	136	6	5	69
Sanitarians	66	63	—	3	36
Bacteriologists, laboratory scientists	64	50	7	7	38
Statisticians	59	48	—	11	33
Engineers	40	27	3	10	13
Dietitians, nutritionists	55	40	3	12	26
Veterinarians	22	19	2	1	11
Dentists	66	43	9	14	29
Chemists, biochemists	37	29	2	6	26
Social workers	29	28	—	1	11
Biologists, entomologists	29	28	—	1	19
Physicists	19	19	—	—	14
Physical therapists	17	16	1	—	14
Anthropologists, psychologists, sociologists	21	15	3	3	12
Industrial hygienists	13	13	—	—	9
Pharmacists	25	21	3	1	16
Medical record librarians	8	7	1	—	1
Other [4]	24	22	1	1	17

[1] Includes 1,284 master's degrees (M.P.H., D.P.H., M.S.P.H., M.S. Hyg., M.H.A., D.H.A. and other master's) and 92 doctor's degrees (D.P.H., Sc.D., and Ph.D.). The 14 schools in the United States awarded 1,222 degrees; the 1 school in Puerto Rico, 76 degrees; the 2 schools in Canada, 78 degrees (77 master's and 1 doctor's degree).

[2] Includes 1,004 graduates from 50 States and the District of Columbia, 72 from Puerto Rico, and 1 from Guam.

[3] The other 699 graduates were sponsored as follows: 210, own government or own employer; 26, AID; 59, other U.S. government agencies; 55, WHO; 50, fund or foundation; 235, self-sponsored; 64, other.

[4] Includes 4 clergymen, 4 dental hygienists, 3 journalists, 2 accountants, 2 economists, 2 lawyers, 2 physiologists, 1 historian, and 4 not stated.

Source: Troupin, J. L.: *Schools of Public Health in the United States and Canada, for the Year Ending June 1968.* New York. American Public Health Association (mimeo). Ninth annual report.

Table 7. OCCUPATIONAL CLASSIFICATION OF FULL-TIME FEDERAL WHITE-COLLAR EMPLOYEES: PUBLIC HEALTH SERVICE, OCTOBER 31, 1968, ALL FEDERAL AGENCIES AND SELECTED AGENCIES, OCTOBER 31, 1967

GS series [1]	Occupational series	Public Health Service, 1968	All Federal agencies, 1967 [2]	Selected agencies, 1967		
				Department of Defense	Department of Health, Education, and Welfare	Veteran's Administration
	All occupations	[3] 27,652	1,932,510	629,948	96,957	116,166
000-099	Miscellaneous (n.e.c.)	303	39,565	22,463	291	1,623
100-199	Social science, psychology, and welfare:					
101	Social science	74	1,276	53	328	196
110,119	Economics	10 (1)	4,540 (89)	195	49	3
180, 181	Psychology	251 (21)	2,132 (196)	649	260	1,068
184	Sociology	16	37	1	18	—
185	Social work	125	2,215	34	117	1,713
188, [4] 189	Recreational therapist	31 (2)	2,247 (—)	1,496	34	635
(100)	Other occupations within group	22	20,757	3,860	10,385	61
200-299	Personnel administration and industrial relations	464	37,089	21,688	1,039	1,401
300-399	General administrative, clerical, and office services:					
330-335	Digital computer systems	407	25,596 (2,076)	18,683	1,502	662
340	Program management	78	3,048	392	93	133
341	Administrative assistant and officer	460	9,574	3,107	801	317
359, 362	Electric accounting machine	69 (37)	4,474 (701)	3,241	264	153
(300)	Other occupations within group	8,116	413,635	200,814	33,596	26,936
400-499	Biological sciences:					
401, 404	Biology	1,503 (1,017)	7,117 (4,680)	955	1,627	806
403	Microbiology	346	1,394	455	503	214
405	Pharmacology	67	195	35	136	9
413	Physiology	46	266	90	50	29
414	Entomology	41	739	66	42	—
493	Home economics (nutrition)	8	248	22	36	—
(400)	Other occupations within group	36	31,967	443	38	12
500-599	Accounting and budget	814	112,965	48,142	2,596	3,821
600-699	Medical, hospital, dental, and public health:					
602	Medical officer	593	10,121	[5] 419	[6] 4,037	[6] 5,368
605-621	Nurse	6,023 (3,676)	61,439 (38,147)	[5] 8,945	[6] 6,670	[6] 44,680
630	Dietitian	81	1,066	7	152	901
631	Occupational therapist	44	533	5	49	473
633	Physical therapist	22	670	8	120	535
635	Corrective therapist	—	496	—	1	495
636	Physical medicine and rehabilitation therapy	51 (51)	1,115 (1,115)	52	54	1,004
637	Manual arts therapist	6	387	—	6	381
639	Educational therapist	8	153	—	7	146
644, 645	Medical technology	580 (357)	4,533 (2,983)	1,158	594	2,703
647	Medical radiology	175 (175)	1,680 (1,680)	348	162	1,154

See footnotes at end of table.

Table 7. OCCUPATIONAL CLASSIFICATION OF FULL-TIME FEDERAL WHITE-COLLAR EMPLOYEES: PUBLIC HEALTH SERVICE, OCTOBER 31, 1968, ALL FEDERAL AGENCIES AND SELECTED AGENCIES, OCTOBER 31, 1967—Continued

GS series [1]	Occupational series	Public Health Service, 1968	All Federal agencies, 1967 [2]	Selected agencies, 1967		
				Department of Defense	Department of Health, Education, and Welfare	Veteran's Administration
649 [7]	Medical machine	27 (27)	464 (464)	77	25	359
650	Medical technical	126 (126)	130 (130)	—	125	—
660, 661	Pharmacy	45 (36)	1,472 (288)	149	433	880
662	Optometry	—	45	35	—	7
665	Speech pathology and audiology	7	142	31	11	100
667	Orthotist and prosthetist	3	220	57	3	158
668	Podiatrist	1	22	1	1	20
669	Medical record librarian	54	237	87	56	91
670	Hospital administration	62	321	11	64	219
680	Dental officer	15	1,288	[5] 7	[6] 538	[6] 730
681	Dental assistant	313 (313)	1,972 (1,972)	1,055	302	604
682	Dental hygiene	10	313	241	9	59
683	Dental laboratory technician	38 (38)	692 (692)	253	38	396
685	Public health program specialist	452	2,374	4	2,283	—
690	Industrial hygiene	7	89	54	7	—
695, 696	Food and drug	— (- -)	900 (725)	1	868	—
699 [8]	Health aid and technician	157 (157)	1,579 (1,579)	585	174	781
(600)	Other occupations within group	391	1,711	71	327	1,298
700–799	Veterinary medical science	7	2,393	15	173	6
800–899	Engineering and architecture:					
801, 802	General engineering	204 (162)	39,691 (27,295)	24,402	207	382
803	Safety engineering	5	457	248	5	3
810	Civil engineering	27	17,585	9,070	150	91
819	Sanitary engineering	18	1,285	111	677	5
855, 856	Electronic engineering	143 (106)	35,311 (20,320)	22,336	138	51
893	Chemical engineering	54	1,544	995	43	—
(800)	Other occupations within group	88	48,719	29,738	169	283
900–999	Legal and kindred	43	44,697	2,235	16,457	5,426
1000–1099	Information and arts:					
1020	Illustrating	56	2,763	2,222	67	34
1021	Office drafting	12	296	204	13	2
1071	Audio-visual production	28	777	513	29	4
1081	Public information	164	2,323	973	296	21
1082	Writing and editing	100	1,888	996	157	3
1083	Technical writing and editing	44	1,836	1,481	44	3
1084	Visual information	33	924	498	53	9
1087	Editorial assistance	68 (68)	1,881 (1,881)	1,252	90	19
(1000)	Other occupations within group	125	7,372	2,940	182	187
1100–1199	Business and industry	355	53,663	31,174	430	1,244
1200–1299	Copyright, patent, and trademark	—	1,790	247	3	—
1300–1399	Physical sciences:					
1301, 1311	General physical sciences	248 (210)	9,909 (3,642)	3,105	528	73
1306	Health physics	21	262	87	22	2

See footnotes at end of table.

Table 7. OCCUPATIONAL CLASSIFICATION OF FULL-TIME FEDERAL WHITE-COLLAR EMPLOYEES: PUBLIC HEALTH SERVICE, OCTOBER 31, 1968, ALL FEDERAL AGENCIES AND SELECTED AGENCIES, OCTOBER 31, 1967—Continued

GS series [1]	Occupational series	Public Health Service, 1968	All Federal agencies, 1967 [2]	Selected agencies, 1967		
				Department of Defense	Department of Health, Education, and Welfare	Veteran's Administration
1310	Physics	56	5,806	4,204	54	44
1320	Chemistry	880	8,302	2,755	1,812	651
1382	Food technology	—	112	38	8	—
(1300)	Other occupations within group	4	18,186	7,814	22	1
1400–1499	Library and archives	317	7,717	3,022	397	397
1500–1599	Mathematics and statistics:					
1520–1530	Mathematician and statistician	313	7,560 (590)	3,964	523	61
1531	Statistical assistant	394 (394)	6,757 (6,757)	2,571	584	245
(1500)	Actuary, cryptography, and other	80	1,319	1,015	56	16
1600–1699	Equipment, facilities, and service	138	19,197	15,810	158	86
1700–1799	Education:					
1715	Vocational rehabilitation	2	117	—	4	103
1725	Public health educator	27	30	1	29	—
(1700)	Other occupations within group	127	24,122	15,025	1,040	20
1800–1899	Investigation:					
1860	Public health inspection	80	214	33	92	—
(1800)	Other occupations within group	311	34,378	670	744	95
1900–1999	Commodity quality control, inspection, and grading	13	21,062	16,478	9	4
2000–2099	Supply	487	82,086	70,048	679	3,048
2100–2199	Transportation	62	32,689	11,013	92	213
2300–2350	Postal group	—	568,250	—	—	—

[1] If the GS series indicates assistant or technician in the title, the number of employees is shown in parentheses ( ) after the total.

[2] Includes all employees in the United States and U.S. citizens employed abroad. Includes all branches of the Government for which data could be obtained. Only three agencies are shown separately here.

[3] Does not include 6,086 blue-collar workers or 6,491 commissioned officers classified as follows: 3,098 physicians, 537 dentists, 252 nurses, 107 veterinarians, 756 sanitary engineers, 797 health services officers, 322 pharmacists, 228 scientists, 228 sanitarians, 74 dietitians, and 97 therapists.

[4] New GS series.

[5] Does not include active duty uniformed services.

[6] Includes physicians, dentists, and nurses whom the Public Health Service and Veterans Administration classify under other pay laws.

[7] The title has been changed from "electrocardiograph technician" to "medical machine technician." Many of the positions to be classified to this series were formerly classified in the "electroencephalograph technician" series, GS–659 (now abolished) and the "medical aid" series, GS–699 (now titled "health aid and technician" series).

[8] The title has been changed from "medical aid" to "health aid and technician." Series GS–663 "optometry aid," GS–626 "embalmer," and GS–666 "speech and hearing technician" are now classifiable to the "health aid and technician" series.

Sources: U.S. Civil Service Commission: *Occupations of Federal White-Collar Workers: October 31, 1967*. Pamphlet SM 56–7. Washington. U.S. Government Printing Office, 1968.
U.S. Department of Health, Education, and Welfare, Office of Personnel and Training, Division of Management Compensation and Systems, Data Systems and Reports Branch.

Table 8. EMPLOYMENT IN SELECTED FEDERAL WHITE-COLLAR OCCUPATIONS: OCTOBER 31, 1964, 1966, and 1967

GS series	Occupational series	1964	1966	1967
602	Medical officer	11,653	9,689	10,121
610	Nurse	22,721	23,465	23,292
621	Nursing assistant	35,955	37,427	38,147
630	Dietitian	1,161	1,113	1,066
636	Physical medicine and rehabilitation therapy assistant	1,047	1,061	1,115
645	Medical technician	2,639	2,920	2,983
647	Radiology technician	1,570	1,631	1,680
681	Dental Assistant	1,308	1,758	1,972
685	Public health program specialist	1,646	1,925	2,374
699	Health aid	1,593	1,869	1,579
701	Veterinary medical scientist	2,289	2,339	2,393

Source: U.S. Civil Service Commission: *Occupations of Federal White-Collar Workers: October 31, 1967*. Pamphlet SM 56-7. Washington. U.S. Government Printing Office. June 1968. Also prior issues.

Table 9. OCCUPATION OF FULL-TIME EMPLOYEES OF STATE HEALTH DEPARTMENTS AND LOCAL HEALTH UNITS: UNITED STATES, JANUARY 1, 1964, 1965, AND 1966

Occupation	State health department employees			Local health unit employees, 1964 [1]
	1964	1965	1966	
All occupations	19,009	22,697	25,346	51,632
Physicians	609	708	737	1,668
Public health nurses	869	1,571	1,699	16,058
Clinic nurses	61	95	92	841
Dentists	164	166	166	402
Dental hygienists	58	66	64	496
Engineers	830	996	1,065	464
Sanitarians	688	1,072	1,093	7,508
Other sanitation personnel	350	544	663	2,188
Laboratory personnel	2,158	2,285	2,545	1,546
Health educators	233	286	324	361
Nutritionists	146	187	207	177
Social workers	230	291	296	688
Psychologists	69	66	53	156
Analysts and statisticians	387	544	554	250
Veterinarians	51	62	57	209
Public health investigators	337	403	491	543
X-ray technicians	222	197	191	380
Physical therapists	82	127	122	249
Administrative management	1,128	1,443	1,682	795
Clerical	7,733	8,776	9,357	11,634
Maintenance and service	1,677	2,101	3,406	3,143
Other personnel [2]	[3] 927	711	482	1,876

[1] Latest data available.

[2] Includes some personnel in special programs such as air pollution, water pollution, radiological health, industrial hygiene, alcoholism, and community health.

[3] Includes attorneys, consultants, program representatives, and others who work with administrative management. These occupations were included in the administrative management group in 1965 and 1966.

Source: Bureau of State Services, Community Health: *Joint Form 5, Report of State Health Department Personnel by Organizational Unit, and Report of Public Health Personnel Submitted by Local Health Departments*. Public Health Service, U.S. Department of Health, Education, and Welfare. Mimeographed tables dated Aug. 9, 1966, Jan. 4, 1966, and May 17, 1965. Data for United States, Puerto Rico, Guam, and the Virgin Islands.

Table 10. SELECTED OCCUPATIONS OF EMPLOYEES OF STATE GOVERNMENT AGENCIES: 1967

Occupation	Total	Health	Mental health
All health professions	36,400	14,710	21,690
Public health officers (M.D.)	1,000	970	30
Psychiatrists (M.D.)	3,980	70	3,910
Physicians, all other (M.D. and D.O.)	4,080	1,340	2,740
Dentists (D.D.S. or D.M.D.)	910	310	600
Professional nurses (R.N.)	23,520	9,130	14,390
Veterinarians (D.V.M.)	70	70	—
Sanitarians	2,840	2,820	20

Source: U.S. Department of Labor, Bureau of Labor Statistics: *Monthly Labor Review*, 92(8): 40–45, August 1969.

Table 11. PERSONNEL IN HOSPITALS: APRIL 1966

Category of personnel	Number	Category of personnel	Number
Total professional and technical	[1] 1,332,100	Physical therapy assistant	5,200
		Social worker	10,700
Nursing service:		Social work assistant	1,500
Nurse—R.N.	361,000	Recreation therapist	3,800
Licensed practical nurse	150,600	Inhalation therapist	5,600
Surgical technician	17,600	Speech pathologist and audiologist	1,200
Aide, orderly (except in psychiatric hospitals)	374,400	Radiology:	
Aide, orderly in psychiatric hospitals	117,600	Radiologic technologist	24,000
Diagnostic services:		X-ray assistant	6,000
Medical technologist	54,500	Pharmacy:	
Laboratory assistant	14,600	Pharmacist	9,400
Cytotechnologist	1,600	Pharmacy assistant	5,600
Histologic technician	3,900	Medical records:	
Electrocardiograph technician	5,900	Medical record librarian	6,300
Therapeutic services:		Medical record technician	10,100
Occupational therapist	4,100	Dietary:	
Occupational therapy assistant	3,800	Dietitian	12,700
Physical therapist	8,500	Food service manager	5,400
		All other professional and technical	106,500

[1] Estimates for 7,000 AHA registered hospitals based on 5,300 returns in PHS-AHA survey.

Source: Bureau of Health Manpower: *Health Manpower Perspective: 1967*. PHS Pub. No. 1667. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1967.

Table 12. FULL-TIME PERSONNEL IN NURSING AND PERSONAL CARE FACILITIES: APRIL-JULY 1968

Category of personnel	Total	Nursing care	Personal care	
			with nursing	without nursing
Total professional and technical	279,288	229,937	39,425	9,926
Nursing services:				
Nurse—R.N.	25,139	21,263	3,265	611
Licensed practical nurse or vocational nurse	35,725	29,561	5,061	1,103
Aide, orderly, attendant	186,411	155,315	25,121	5,975
Therapeutic services:				
Physical therapist	944	846	75	23
Physical therapy assistant	1,411	1,238	155	18
Recreation therapist	1,743	1,385	263	95
Registered occupational theapist	450	373	58	19
Other occupational therapists and assistants	1,269	1,058	192	19
Social worker	722	571	121	30
Speech therapist	86	77	7	2
Medical records:				
Registered medical record librarian	192	158	17	17
Other medical records librarians and technicians	948	818	88	42
Dietary:				
Dietitian	3,082	2,087	656	339
All other professional and technical	21,166	15,187	4,346	1,633

Source: NCHS 1968 survey of all nursing and personal care facilities. Domiciliary care homes excluded from survey.

CHAPTER 1

Administration of Health Services

Administration is one of the top goals of advancement in many professions. In the health field it is customary for a physician to serve as the head of a public health department; a visiting nurse service may be administered by a registered nurse; and a laboratory, by a scientist. Among other professional persons in administrative positions are dentists, veterinarians with public health training, public health engineers and other specialists in environmental control, health statisticians, public health educators, health information specialists, social workers, and others with a solid foundation of professional skill.

In recent years an increasing number of administrators have been employed with professional training and competence in administration as a specialty in its own right. Working with the health administrator and others are health program analysts, health program representatives, and other staff members with similar position titles, all of whom help to strengthen efficiency, planning, and leadership within the health organization. There were an estimated 39,000 to 45,000 of these administrative persons employed in 1968 in the health organizations listed below:

Health organization:	*Estimated numbers employed*[1]
Health department	4,000 to 5,000 public health administrators, program analysts, and program representatives.
Hospitals	15,000 to 16,000 hospital administrators and assistants.
Nursing and personal care homes.	14,000 to 16,000 nursing home administrators and assistants.
Voluntary health agencies	6,000 to 8,000 voluntary health agency administrators and program representatives.

[1] Excludes administrative personnel who are also physicians, nurses, and other health personnel with specific professional skills. These are counted in the chapters relating to the specific occupations.

Workers are also needed to provide the necessary business, clerical, and maintenance services. Persons that are concerned with these aspects include: accountant, admitting officer, business manager, cashier, comptroller, credit manager, director of office services, director of volunteer services, employment interviewer, employment manager, housekeeper and housekeeping workers, job analyst, laundry manager and workers, maintenance workers, personnel director, purchasing agent, stationary engineers, and stockroom manager. No statistics on employment in these occupations are provided since most of them are not unique to the health field.

Health Department Administration

State and local health departments are the official government agencies responsible for providing leadership in making the community a healthier and safer place in which to live. The health department may administer programs concerned with general health services, specific medical care services, and/or environmental control related to health. With few exceptions, the *health officer* or *commissioner* is a physician who usually has had public health training and experience (see ch. 18). The health officer, as chief executive of the health department, administers the direct services for which responsibility is assigned to his department by law. He also assumes leadership in stimulating community-wide cooperation and action to strengthen gaps in health practices and services in the area.

In a large health department a *public health administrator* may serve as alter ego of the health officer on all matters pertaining to administrative management. This executive has responsibility for organizing, planning, and directing such functions as budget, personnel, procurement, legal and related administrative services, and perhaps statistics, research, and other professional programs.

He has professional competence in administrative practices and procedures, particularly as they relate to public health programs. His training may have been in a school of public health. In 1967–68, 136 administrators were graduated from U.S. schools of public health with major subjects in administration in public health, medical care or hospitals. The U.S. Public Health Service sponsored the education of 69 administrators graduating from schools of public health in the U.S. and other countries (table 6, Introduction).

Another specialist who is frequently included on the staff of larger health departments is a health *program analyst*. This person is a planning specialist—a professional expert in his own right, with basic training in some field such as statistics, economics, or sociology. He may also be known as a public health analyst or specialist.

The director of each program in the health department probably has on his staff a health *program representative*. This position requires someone with a bachelor's degree although he may not be trained in a specific health profession. This public health advisor or representative takes part in promoting public participation in new health services, program planning, and fact gathering.

About 4,000 to 5,000 persons were estimated to be employed in 1968 in positions of public health administrator, health program analyst, and health program representative, in State and local health departments, and in Federal health programs.

Many of these persons are members of the Association of Management in Public Health (743 members in 1968) and the American Public Health Association.

Administration of Hospitals, Nursing Homes, and Related Institutions

As the hospital developed into a highly specialized institution, it required a skilled and trained person to manage its general activities and functions. This is the role of the *hospital administrator* sometimes also identified as the *executive director*, *executive vice president* or *president* who serves as the chief executive officer of the hospital. He administers and coordinates all activities of the hospital within the general policies established by a governing board and provides liaison between the governing body and the medical staff.

In 1968, there were approximately 15,000 to 16,000 administrators, including assistants, in some 8,000 hospitals of all types in the United States. This estimate of the number of administrators is derived from available data on hospitals registered by the American Hospital Association (*12*) and on other hospitals included in the NCHS Master Facility Inventory (*13*). The American College of Hospital Administrators has about 9,000 members.

About two-thirds of these administrators work in nonprofit or private hospitals, and the remainder work in Federal, State, and local government hospitals. Slightly more than 12 percent of U.S. hospital administrators were physicians in 1965 (*14*). The growth of professional personnel as hospital administrators and assistants is indicated by the increase in numbers employed from fewer than 9,000 in 1950 to about 12,000 in 1960, and approximately 15,000 to 16,000 in 1968.

Graduate programs leading to a master's degree in hospital administration consists of 1 or 2 years of academic study, and may include a period of up to 1 year of "administrative residence" in a hospital or other health related facility or organization. In 1968, 460 students completed the academic requirements for a degree in hospital administration. Twenty-six schools in the United States offered graduate courses in this field (tables 13 and 14). Additional programs in hospital administration are expected to be established within the next few years. In 1968, the Accrediting Commission on Graduate Education for Hospital Administration was formed as the organization which formally accredits and recognizes graduate programs in hospital administration. The Commission includes representatives of the American College of Hospital Administrators, American Hospital Association, American Public Health Association and the Association of University Programs in Hospital Administration.

In 1964, 17,400 nursing care and related homes in the United States also required administrative management. An estimated 21,000 persons (including physicians, nurses, and other health personnel) were employed as nursing home administrators and assistant administrators (*15*). About 9,000 of these persons had additional duties, such as nursing. The 12,000 persons without additional duties probably include some professional or practical nurses, although they reported that serving as administrator or assistant administrator was their only job in the home.

In 1968, there were approximately 19,500 nursing care and related homes in the United States (table 169). The number of nursing home administrators and assistant administrators excluding physicians, nurses and other health personnel, is now estimated to be between 14,000 and 16,000.

Administration of Voluntary Health Agencies

Voluntary health agencies are nonprofit organizations supported primarily by contributions from the public rather than from government sources or endowments. They engage in programs of research, education, and service to individuals and communities in their particular sphere of interest —generally a group of related diseases or of related services. Many are organized nationally with State and local affiliates. Thus, positions with these organizations will have varying breadth of responsibilities depending on the level at which the individual is engaged in the specific activity.

The *administrator* or *executive* director of the health agency is administratively responsible for coordinating the activities of paid and voluntary personnel to see that an effective program is developed. His responsibilities include working with the board of directors to set the course of the agency's activities; informing the community of the health problems and their resources for meeting them; promoting local fund raising; helping to recruit volunteer workers; and carrying out personnel functions of the staff. In the majority of voluntary health agencies, the local units are so small that the person employed as administrator or executive is generally expected also to have specialized skills in one or more of the technical aspects of the local program, e.g., physical therapy, nursing, fund raising, and health education. The positions which place primary emphasis on administration and administrative skills are more frequently found at the State or national level.

The *program representative* maintains the contact through which the State, regional, or national organization and its affiliates communicate with each other and work together. He helps the State or local executive by acting as a consultant for the program in his community and works with community leaders to set up a local unit.

There are about 60 national voluntary health agencies in the United States. Most of the large agencies are members of the National Health Council. The National Health Council estimates a minimum of 6,000 to 8,000 persons are employed in administrative and program professional positions on national, State, and local levels. This is less than had been estimated in the previous editions of this publication.

REFERENCES

(*12*) American Hospital Association: Hospitals, Guide Issue, Part 2. *J.A.H.A.* 39 (15): 404, August 1969.

(*13*) National Center for Health Statistics: Development and maintenance of a national inventory of hospitals and institutions. *Vital and Health Statistics.* PHS Pub. No. 1000—Series 1—No. 3. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, February 1965.

(*14*) Dolson, M.T.: *M.D.-administrators are older, earn more money, run bigger hospitals: survey.* Modern Hospital. February 1969.

(*15*) National Center for Health Statistics: Employees in nursing and personal care homes, United States, May–June 1964. *Vital and Health Statistics.* PHS Pub. No. 1000—Series 12—No. 5. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, September 1966.

Table 13. SELECTED SCHOOLS OFFERING HOSPITAL ADMINISTRATION PROGRAMS, STUDENTS, AND GRADUATES: SELECTED YEARS, 1949-50 THROUGH 1968-69

Academic year	Schools [1]	Students	Graduates	Academic year	Students	Schools [1]	Graduates
1968–69	21	972	—	1962–63	16	—	—
1967–68	17	868	406	1961–62	15	—	243
1966–67	16	839	330	1960–61	14	—	—
1965–66	16	770	305	1959–60	14	—	—
1964–65	16	695	279	1954–55	13	—	200
1963–64	16	—	243	1949–50	13	—	126

[1] Member programs of AUPHA. See table 14 for 5 additional programs in 1969.

Source: Association of University Programs in Hospital Administration.

Table 14. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING HOSPITAL ADMINISTRATION PROGRAMS AND NUMBER OF STUDENTS AND GRADUATES: 1969

Location	School	Ownership	Students	Graduates
	Total, 26 schools		1,153	460
Ala	University of Alabama, Birmingham [1]	Public	18	5
Calif	University of California, Berkeley [1]	do	28	3
	University of California, Los Angeles [1]	do	48	24
Colo	University of Colorado, Boulder [2]	do	7	—
Conn	Yale University, New Haven [1]	Private	27	12
D.C	George Washington University, Washington [1]	do	115	60
Fla	University of Florida, Gainesville [1]	Public	23	10
Ga	Georgia State College, Atlanta	do	28	9
Ill	University of Chicago, Chicago [1]	Private	32	13
Iowa	University of Iowa, Iowa City [1]	Public	29	17
Mich	University of Michigan, Ann Arbor [1]	do	36	15
Minn	University of Minnesota, Minneapolis [1]	do	66	34
Mo	St. Louis University, St. Louis [1]	Private	51	28
	University of Missouri, Columbia [1]	Public	25	6
	Washington University, St. Louis [1]	Private	43	14
N.Y	Columbia University, New York City [1]	do	32	17
	Cornell University, Ithaca [1]	do	48	12
	Wagner College, Staten Island	do	57	18
N.C	Duke University, Durham [1]	do	34	14
Ohio	Xavier University, Cincinnati	do	85	27
Pa	Temple University, Philadelphia [2]	Private	4	—
	University of Pittsburgh, Pittsburgh [1]	Public	33	15
Tex	Baylor University Medical Service School, Fort Sam Houston [1]	Private	117	55
	Trinity University, San Antonio [1]	do	72	12
Va	Medical College of Virginia, Richmond [1]	Public	50	25
P.R	University of Puerto Rico, San Juan [1]	do	45	15

[1] Member programs of AUPHA.

[2] 1st graduating class in 1969.

Source: Association of University Programs in Hospital Administration.

CHAPTER 2

Anthropology and Sociology

Four of the basic social sciences have specialists concerned with the utilization of their findings in the solution of health problems. Anthropology and sociology are considered in this chapter; economics is discussed in chapter 10, and psychology, in chapter 27.

The contributions of anthropologists and sociologists to health are primarily through research. Those in the health field are most often employed on the teaching or research staff of medical colleges and graduate departments of schools of public health and preventive medicine. A few find employment on hospital staffs in large health departments.

More than 1,200 anthropologists and 6,600 sociologists responded to the 1968 National Science Foundation's National Register of Scientific and Technical Personnel. A survey of the supply of and demand for anthropologists and sociologists has been conducted and published by the National Institute of Mental Health of the Public Health Service (*16*).

Information on the number of degrees conferred in the fields of anthropology and sociology is given in tables 15 and 16. No information is available on degrees with specialization on the health aspects of these subjects.

Anthropologist

The *anthropologist* makes comparative studies of the origin, evolution, and races of man; the cultures that he has created; and man's distribution and physical characteristics. Physical anthropologists study the significance and causes of physical differences in man and the interrelated effects of culture, heredity, and environment on the human form. Cultural or social anthropologists study cultural factors related to personality, mental illness, psychological development, and psychobiological stress. These two kinds of anthropologists may be considered as part of the health manpower resources.

According to the American Anthropological Association (5,000 members), there were about 3,000 anthropologists employed in this country in 1968. Of this total, approximately 600 were *cultural anthropologists* and *physical anthropologists* employed in the health field.

Sociologist

Sociology is the discipline concerned with the structure, function, and role of social institutions and social behavior. *Sociologists* considered as part of health manpower try to identify such diverse social factors as those influencing the occurrence of disease, the behavior of patients, and the organization of the health professions.

The American Sociological Association identified 7,000 sociologists employed in the United States in 1968. According to the Association perhaps as many as 800 were *medical sociologists* concerned with health as indicated by membership in the Section on Medical Sociology.

REFERENCES

(*16*) National Institute of Mental Health: *Sociologists and Anthropologists: supply and demand in educational institutions and other settings.* PHS Pub. No. 1884. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969.

Table 15. EARNED DEGREES CONFERRED IN ANTHROPOLOGY AND SOCIOLOGY: 1960-61 THROUGH 1966-67

Academic year	Anthropology			Sociology		
	Bachelor's degree	Master's degree	Doctor's degree	Bachelor's degree	Master's degree	Doctor's degree
1966–67	1,825	357	136	17,751	1,193	327
1965–66	1,503	297	98	15,203	981	244
1964–65	1,203	224	88	12,896	789	230
1963–64	964	180	85	11,053	646	198
1962–63	746	160	86	9,055	684	208
1961–62	577	143	82	8,183	578	173
1960–61	484	87	49	7,519	504	184

Sources: National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1965–66.* OE–54013A–66. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Also prior annual issues. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands.

National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part A—Summary Data, 1966–67.* OE–54013–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands.

Table 16. LOCATION OF SCHOOLS CONFERRING DEGREES IN ANTHROPOLOGY AND/OR SOCIOLOGY AND NUMBER OF GRADUATES: 1966-67

Location	Anthropology			Sociology		
	Bachelor's degree	Master's degree	Doctor's degree	Bachelor's degree	Master's degree	Doctor's degree
Total, 850 schools	1,825	357	136	17,751	1,193	327
Alabama	4	3	—	224	—	—
Alaska	4	—	—	8	—	—
Arizona	54	12	6	121	2	—
Arkansas	2	1	—	114	4	—
California	602	79	22	2,219	166	37
Colorado	50	21	2	248	21	2
Connecticut	19	3	1	177	8	10
Delaware	—	—	—	44	2	—
District of Columbia	32	5	5	169	22	8
Florida	30	4	—	323	19	9
Georgia	9	1	—	373	17	—
Hawaii	16	6	1	103	17	—
Idaho	2	—	—	31	—	—
Illinois	67	24	23	829	97	23
Indiana	15	6	2	387	51	9
Iowa	12	1	2	388	23	15
Kansas	29	1	—	188	12	1
Kentucky	3	1	—	229	10	5
Louisiana	15	3	1	218	2	6
Maine	—	—	—	98	3	—
Maryland	—	—	—	239	8	8
Massachusetts	43	18	19	663	29	14
Michigan	52	30	3	704	79	21
Minnesota	32	4	4	628	19	9
Mississippi	6	1	—	118	18	4
Missouri	12	7	—	337	31	19

Table 16. LOCATION OF SCHOOLS CONFERRING DEGREES IN ANTHROPOLOGY AND/OR SOCIOLOGY AND NUMBER OF GRADUATES: 1966-67—Continued

Location	Anthropology			Sociology		
	Bachelor's degree	Master's degree	Doctor's degree	Bachelor's degree	Master's degree	Doctor's degree
Montana	12	5	—	85	7	—
Nebraska	9	2	—	150	8	3
Nevada	3	1	—	7	1	—
New Hampshire	10	—	—	99	1	—
New Jersey	—	—	—	316	21	6
New Mexico	22	7	—	35	5	—
New York	269	41	29	1,776	147	49
North Carolina	8	3	1	512	15	10
North Dakota	1	—	—	23	3	—
Ohio	31	11	—	822	64	8
Oklahoma	8	1	—	198	13	—
Oregon	39	7	3	243	8	3
Pennsylvania	96	14	3	786	44	9
Rhode Island	14	1	—	118	11	2
South Carolina	2	—	—	165	—	—
South Dakota	1	—	—	83	6	—
Tennessee	7	3	—	349	14	1
Texas	36	6	—	654	49	5
Utah	7	—	—	361	20	2
Vermont	11	—	—	87	—	—
Virginia	17	—	—	481	4	—
Washington	50	18	6	400	20	11
West Virginia	—	—	—	156	21	—
Wisconsin	61	6	3	449	48	18
Wyoming	1	—	—	9	3	—
Guam	—	—	—	6	—	—
Puerto Rico	—	—	—	201	—	—

Source: National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part B—Institutional Data, 1966–67.* OE–54013–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968.

CHAPTER 3

Automatic Data Processing

A substantial part of the processing and analysis of statistical data is accomplished with the aid of electrical accounting machines (EAM) and electronic data processing equipment (EDP). Computers and other electronic business machines developed since 1950 are helping to streamline and expedite large-scale operations throughout the health field. Electronic data processing involves three main job areas—systems analysis, programming, and computer operations.

In 1966–67, 207 bachelor's, 364 master's, and 32 doctor's degrees were awarded in the field of data processing, computer science and systems analysis (table 17).

The *health systems analyst* defines the broad outlines of the machine solution of the problem. He must have a detailed understanding of the application to the health field and know the overall capacities of the equipment. Knowledge of electronic data processing may have been obtained through formal courses or on-the-job training or through college instruction leading to a degree in business administration, statistics, engineering, or a related science.

The *programer* prepares problem solving procedures, flow charts, and computer instructions for which he does not need specialized competency in the health field. These instructions, along with problem data, are translated into computer language and fed to the computer via punch card tape, page readers, or other means of input. Computer programing ordinarily calls for a college degree with courses in mathematics, physics, or engineering. A number of colleges are developing graduate and undergraduate courses in computer programing and technology.

The *computer operator* has the task of operating the console and reading the documentation provided, so that the machine creates the output information from the designated inputs. Educational requirements vary from on-the-job training to courses in a technical school or college. Similar education is required for the operation of conventional punch card equipment, including sorters, collators, and tabulators. However, no special training is required for working in a health setting.

Information on the numbers of persons who are employed in the health field as programers, and operators of EAM and EDP equipment is not available, nor are estimates available for *electronic technicians* and related personnel. The Data Processing Management Association has an estimated 27,000 members, many of whom are employed in the health field. The Association estimated between 700 and 1,000 persons were employed in 1968 as systems analysts in the health field.

Table 17. EARNED DEGREES CONFERRED IN DATA PROCESSING, COMPUTER SCIENCE AND SYSTEMS ANALYSIS: 1964-65 THROUGH 1966-67

Academic year	Data Processing		Computer Science			Systems Analysis		
	Bachelor's degree	Master's degree	Bachelor's degree	Master's degree	Doctor's degree	Bachelor's degree	Master's degree	Doctor's degree
1966–67	48	24	71	239	20	88	101	12
1965–66	37	19	22	157	14	30	26	—
1964–65	25	5	6	57	5	—	34	—

Sources: National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1965–66*. OE–54013A–66. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Also prior annual issues. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands.

National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part A—Summary Data, 1966–67*. OE–54018–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands.

CHAPTER 4

Basic Sciences in the Health Field*

Science is basic to all activities in the health field. Scientists with an academic background in one of the basic scientific disciplines or in the application of mathematics to these disciplines engage in research to provide new knowledge and deeper insights in every health profession. The biological sciences provide the basic supply for medical research. However, modern medical research is also drawing heavily upon scientists trained in an increasing diversity of fields of study within the sciences—mathematical, natural, and social.

Estimates for 1968, indicate that 70,500 professional workers were engaged in medical and health-related research. This represents more than a three fold increase in numbers since 1954, the first year for which estimates were available (table 18).

This 1968 figure for research scientists includes 19,300 professional doctors of medicine, dentistry, and veterinary medicine; 35,600 research doctors, Ph.D.'s, Sc.D.'s, etc.; and 15,600 persons with master's or bachelor's degrees. These professional workers function as the principal investigators and collaborators in medical and health-related research. Persons with such training who work as research assistants, technicians, and other supporting personnel are not included.

Nearly two-thirds of the total number are engaged in medical research in universities and research institutes. The remainder are almost equally divided between industry and government. Research is often combined with teaching and/or service for the M.D.'s and Ph.D.'s in medical schools, universities, teaching hospitals, and similar multipurpose institutions.

More than 700 colleges and universities enrolled about 72,300 graduate students in the biological and physical sciences in 1967–68 (table 19). About three-fourths of these students were enrolled in approximately 100 of the schools. The enrollment in each field of study in each of these schools will be presented in a forthcoming publication of the Office of Resources Analysis, Office of the Director, National Institutes of Health.

Total graduate enrollment in those science fields undergirding medical and health-related research increased about 14 percent—from 63,700 in the fall of 1965 to 72,300 in 1967. The basic medical sciences increased 11 percent (from 10,300 to 11,400); other biosciences increased 21 percent (from 16,900 to 20,500); and the physical sciences increased 11 percent (from 36,500 to 40,400).

During 1966–67, degrees conferred in the biological and physical sciences included 5,700 doctor's; 10,400 master's, and 43,300 bachelor's (table 20). At the doctoral level there were 1,000 degrees in the basic medical sciences, 1,200 in other biosciences, and 3,500 in the physical sciences. Since 1965–66, doctorates awarded in the basic medical sciences increased 10 percent, as compared with 6 and 14 percent for the two categories of "other biosciences" and "physical sciences", respectively. Schools that conferred doctor's degrees in 1966–67 are identified in tables 21, 22, 23.

* Most of the data for this chapter were provided by the Public Health Service, National Institutes of Health, Office of the Director for Program Planning and Evaluation, Office of Resources Analysis—Dr. Herbert H. Rosenberg, Director.

Table 18. ESTIMATED SCIENTIFIC AND PROFESSIONAL MANPOWER[1] ENGAGED IN BIOMEDICAL RESEARCH, BY TYPE OF EMPLOYER AND BY LEVEL OF TRAINING: SELECTED YEARS, 1954 THROUGH 1968

Employer and training	1954	1958	1960	1965	1968
Total manpower	19,200	34,600	41,700	64,000	70,500
Type of employer					
Federal Government	3,700	6,900	7,800	11,800	13,100
Industry	3,400	6,500	9,200	11,900	14,700
Universities and research institutes	12,100	21,200	24,700	40,300	42,700
Level of training					
M.D., D.D.S., D.V.M.	----------	[2] 10,000	[2] 11,600	17,000	19,300
Ph.D., Sc.D	----------	[2] 14,700	[2] 18,600	32,000	35,600
Less than doctoral (M.S., M.P.H., M.A., B.S., A.B.)	----------	[2] 9,900	[2] 11,500	15,000	15,600

[1] Scientific and professional manpower includes M.D.'s, Ph.D.'s and others with less than doctoral training who functioned as principal investigator and collaborators. In general, it does not include persons with such training who performed as research assistants; it also excludes technicians and all other supporting personnel.

[2] Revised estimates.

Source: National Institutes of Health: *Resources for Medical Research Report No. 11*, "Biomedical Research Manpower—For the Eighties." Office of Resources Analysis, Office of The Director for Program Planning and Evaluation, U.S. Department of Health, Education, and Welfare. Washington. U. S. Government Printing Office, December, 1968. Updated to 1968.

Table 19. GRADUATE ENROLLMENT IN BIOLOGICAL AND PHYSICAL SCIENCES, FALL SEMESTER 1962, 1965, AND 1967

Field of study	1962		1965		1967	
	Total	Full-time	Total	Full-time	Total	Full-time
Total	46,359	29,386	63,671	42,138	72,311	51,334
Basic medical sciences	7,125	5,195	10,262	7,882	11,383	9,208
Anatomy [1]	727	514	1,059	831	1,184	988
Biochemistry	2,006	1,543	2,933	2,269	3,281	2,686
Biophysics	352	294	555	480	646	551
Microbiology [2]	2,155	1,455	2,935	2,159	3,121	2,432
Pathology [3]	286	194	384	276	472	322
Pharmacology	538	418	832	633	957	799
Physiology [4]	1,061	777	1,564	1,234	1,722	1,430
Other biosciences	10,643	6,525	16,903	10,642	20,481	13,575
Biology, general	3,658	1,585	6,389	3,037	7,510	4,007
Botany, general	1,398	957	1,795	1,247	2,046	1,434
Ecology	96	63	148	138	232	197
Entomology	885	602	1,172	843	1,491	1,083
Genetics	570	443	727	588	848	718
Nutrition	186	160	400	316	366	330
Plant Pathology	538	383	649	458	700	506
Plant Physiology	219	168	275	225	249	203
Zoology, general	2,437	1,641	3,504	2,432	3,922	2,905
Biosciences, all other	656	523	1,844	1,358	3,117	2,192
Physical sciences	28,591	17,666	36,506	23,614	40,447	28,551
Chemistry	12,309	7,659	15,887	10,181	17,328	12,563
Physics	11,005	6,437	13,681	8,810	14,329	10,049
Physical sciences, all other	5,277	3,570	6,938	4,623	8,790	5,939

[1] Includes histology, cytology, and embryology.
[2] Includes bacteriology, virology, mycology, and parasitology.
[3] Excludes plant pathology.
[4] Excludes plant physiology.

Sources: National Center for Educational Statistics: *Summary Report, Students Enrolled for Master's and Higher Degrees, Fall 1965.* OE-54019-65. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1966. Also previous annual issues. Data for United States and Puerto Rico.

National Center for Educational Statistics: *Higher Education: Students Enrolled for Advanced Degrees: Part A—Summary Data, Fall 1967.* OE-54019-67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969. Data for United States, Guam, and Puerto Rico.

Table 20. EARNED DEGREES CONFERRED IN BIOLOGICAL AND PHYSICAL SCIENCES, BY LEVEL OF DEGREE AND NUMBER OF GRADUATES: 1961-62, 1965-66 AND 1966-67

Field of study	Bachelor's degree			Master's degree			Doctor's degree		
	1961–62	1965–66	1966–67	1961–62	1965–66	1966–67	1961–62	1965–66	1966–67
Total	29,836	40,663	43,270	6,555	9,216	10,400	3,452	5,141	5,717
Basic medical sciences	893	1,462	1,612	800	1,049	1,159	574	946	1,039
Anatomy [1]	70	65	62	90	96	112	44	81	90
Biochemistry	141	264	262	178	231	257	183	315	331
Biophysics	19	13	44	16	25	36	25	56	58
Microbiology [2]	570	996	1,108	323	385	477	181	242	289
Pathology [3]	6	—	—	30	65	53	11	35	39
Pharmacology	—	3	—	50	75	83	59	88	93
Physiology [4]	87	121	136	113	172	141	71	129	139
Other biosciences	13,049	22,015	23,864	1,826	3,175	3,829	756	1,150	1,216
Biology, general	9,999	16,866	18,097	788	1,546	1,887	153	226	262
Botany, general	413	473	542	249	316	360	130	203	171
Ecology	—	3	12	—	6	6	2	4	1
Entomology	126	170	206	152	213	223	94	127	144
Genetics	15	42	48	39	65	79	46	71	87
Nutrition	6	22	39	19	116	104	2	26	34
Plant pathology	14	28	23	60	83	108	64	80	90
Plant physiology	3	—	10	11	16	29	21	31	25
Zoology, general	2,404	4,119	4,353	455	660	747	222	293	271
Biosciences, all other	69	292	534	53	154	286	22	89	131
Physical sciences	15,894	17,186	17,794	3,929	4,992	5,412	2,122	3,045	3,462
Chemistry	8,086	9,735	9,872	1,404	1,822	1,805	1,114	1,533	1,700
Physics	4,812	4,609	4,733	1,425	1,949	2,111	667	973	1,183
Physical sciences, all other	2,996	2,842	3,189	1,100	1,221	1,496	341	539	579

[1] Includes histology, cytology, and embryology.
[2] Includes bacteriology, virology, mycology, and parasitology.
[3] Excludes plant pathology.
[4] Excludes plant physiology.

Sources: National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the year 1965–66.* OE–54013 A–66. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Also prior annual issues. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands.

National Center of Educational Statistics: *Higher Education: Earned Degrees Conferred: Part A—Summary Data, 1966–67.* OE–54013–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands.

National Institutes of Health: *Resources for Biomedical Research and Education, Report No. 18.* "Trends in Graduate Enrollment and Ph.D. Output in Scientific Fields, 1960–61 Through 1967–68." Office of Resources Analysis, National Institutes of Health. U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969.

Table 21. LOCATION OF SCHOOLS CONFERRING DOCTOR'S DEGREES IN THE BASIC MEDICAL SCIENCES AND NUMBER OF GRADUATES: 1966-67

Location	School	Total basic medical sciences	Anatomy [1]	Biochemistry	Biophysics	Microbiology [2]	Pathology	Pharmacology	Physiology
	Total, all schools	1,039	90	331	58	289	39	93	139
Ala	University of Alabama, University	2	1	—	—	—	—	—	1
	Auburn University, Auburn	1	—	1	—	—	—	—	—
Ariz	University of Arizona, Tucson	6	—	—	—	6	—	—	—
Ark	University of Arkansas, Fayetteville	8	—	3	—	3	—	2	—
Calif	California Institute of Technology, Pasadena	5	—	3	2	—	—	—	—
	Loma Linda University, Loma Linda	1	1	—	—	—	—	—	—
	Stanford University, Stanford	13	1	5	—	4	—	1	2
	University of California, Berkeley	40	2	12	8	8	1	—	9
	University of California, Davis	23	—	16	—	4	2	—	1
	University of California, Los Angeles	22	3	6	1	3	—	—	6
	University of California, Riverside	2	—	2	—	—	—	—	—
	University of California, San Francisco	8	1	4	—	—	1	2	—
	University of Southern California, Los Angeles	10	1	5	—	1	1	—	2
Colo	Colorado State University, Fort Collins	2	—	—	—	2	—	—	—
	University of Colorado, Boulder	9	2	—	2	1	3	1	—
Conn	University of Connecticut, Storrs	14	—	4	—	4	2	3	1
	Yale University, New Haven	15	1	4	3	1	—	5	1
D.C	Catholic University of America, Washington	1	1	—	—	—	—	—	—
	Georgetown University, Washington	4	—	1	—	1	—	2	—
	George Washington University, Washington	8	—	—	—	6	—	1	1
Fla	University of Florida, Gainesville	4	—	3	—	—	—	—	1
	University of Miami, Coral Gables	6	—	—	—	6	—	—	—
Ga	Medical College of Georgia, Augusta	2	—	1	—	1	—	—	—
	University of Georgia, Athens	17	—	2	—	13	—	—	—
Hawaii	University of Hawaii, Honolulu	6	—	1	—	4	—	—	1
Ill	Illinois Institute of Technology, Chicago	1	—	—	—	—	—	—	1
	Loyola University, Chicago	8	1	2	—	2	—	3	—
	Northwestern University, Evanston	7	1	3	—	—	—	—	3
	Southern Illinois University, Carbondale	2	—	—	—	1	—	—	1
	University of Chicago, Chicago	27	3	8	3	1	4	5	3
	University of Illinois, Urbana	33	2	2	2	11	4	2	10
Ind	Indiana University, Bloomington	15	2	7	—	5	—	—	1
	Purdue University, Lafayette	9	—	9	—	—	—	—	—
	University of Notre Dame, Notre Dame	8	—	—	—	8	—	—	—
Iowa	Iowa State University of Science and Technology, Ames	6	—	3	1	2	—	—	—
	University of Iowa, Iowa City	5	—	2	—	—	—	2	1
Kansas	Kansas State University of Agriculture and Applied Science, Manhattan	10	—	3	—	6	—	—	1
	University of Kansas, Lawrence	15	2	3	1	9	—	—	—
Ky	University of Kentucky, Lexington	7	1	1	—	2	—	—	3
	University of Louisville, Louisville	5	—	3	—	1	—	1	—
La	Louisiana State University, Baton Rouge	9	—	—	—	9	—	—	—
	Tulane University of Louisiana, New Orleans	21	3	9	—	3	—	3	3
Md	Johns Hopkins University, Baltimore	20	4	3	5	7	—	—	1
	University of Maryland, College Park	17	2	2	1	9	—	2	1
Mass	Boston University, Boston	6	—	3	1	1	—	—	1
	Brandeis University, Waltham	12	—	8	—	4	—	—	—
	Harvard University, Cambridge	17	—	9	—	5	—	—	3
	Massachusetts Institute of Technology, Cambridge	1	—	1	—	—	—	—	—
	Tufts University, Medford	2	—	2	—	—	—	—	—

See footnotes at end of table.

Table 21. LOCATION OF SCHOOLS CONFERRING DOCTOR'S DEGREES IN THE BASIC MEDICAL SCIENCES AND NUMBER OF GRADUATES: 1966-67--Continued

Location	School	Total basic medical sciences	Anatomy [1]	Biochemistry	Biophysics	Microbiology [2]	Pathology	Paarmacology	Physiology
Mich.	Michigan State University, East Lansing	23	1	7	—	5	3	—	7
	University of Michigan, Ann Arbor	24	2	6	—	8	1	5	2
	Wayne State University, Detroit	10	2	3	—	1	—	1	3
Minn.	University of Minnesota, Minneapolis	44	9	13	1	8	2	8	3
Miss.	Mississippi State University, State College	2	—	—	—	2	—	—	—
	University of Mississippi, University	7	1	—	—	1	—	—	5
Mo.	St. Louis University, St. Louis	4	—	3	—	1	—	—	—
	University of Missouri, Columbia	11	—	6	—	2	—	—	3
	Washington University, St. Louis	1	—	—	—	—	—	—	1
Mont.	Montana State University, Missoula	1	—	—	—	1	—	—	—
Nebr.	University of Nebraska, Lincoln	6	—	3	—	1	—	—	2
N.J.	Princeton University, Princeton	3	—	3	—	—	—	—	—
	Rutgers, The State University, New Brunswick	18	—	7	—	8	—	—	3
N.Y.	Albany Medical College, Albany	4	—	2	—	—	1	1	—
	Columbia University, New York	10	1	4	1	1	—	1	2
	Cornell University, Ithaca	12	—	4	—	4	1	—	3
	New York University, New York	6	1	3	—	1	—	—	1
	Rockefeller University, New York	6	—	2	3	1	—	—	—
	SUNY Downstate Medical Center, Brooklyn	9	3	—	—	—	—	2	4
	SUNY State University at Buffalo, Buffalo	18	1	4	1	6	1	2	3
	SUNY Upstate Medical Center, Syracuse	8	3	1	—	1	—	1	2
	Syracuse University, Syracuse	2	—	—	—	2	—	—	—
	University of Rochester, Rochester	14	1	2	3	2	3	2	1
N.C.	Duke University, Durham	22	3	12	—	3	—	—	4
	North Carolina State University at Raleigh, Raleigh	5	—	2	—	2	—	—	1
	University of North Carolina, Chapel Hill	13	—	7	—	5	1	—	—
N.Dak.	University of North Dakota, Grand Forks	3	—	3	—	—	—	—	—
Ohio	Case Western Reserve University, Cleveland	4	1	1	—	—	—	—	2
	Ohio State University, Columbus	14	2	—	1	7	1	—	3
	University of Cincinnati, Cincinnati	1	—	—	—	—	—	1	—
Okla.	Oklahoma State University, Stillwater	3	—	—	—	1	—	—	2
	University of Oklahoma, Norman	7	—	4	—	3	—	—	—
Oreg.	Oregon State University, Corvallis	4	—	—	—	4	—	—	—
Pa.	Bryn Mawr College, Bryn Mawr	4	3	—	—	—	—	—	1
	Hahnemann Medical College and Hospital, Philadelphia	3	—	2	—	1	—	—	—
	Jefferson Medical College, Philadelphia	5	—	—	—	—	—	2	3
	Pennsylvania State University, University Park	16	—	4	5	6	—	—	1
	Temple University, Philadelphia	5	1	1	—	1	—	2	—
	University of Pennsylvania, Philadelphia	20	3	5	—	5	3	3	1
	University of Pittsburgh, Pittsburgh	10	1	3	4	—	—	2	—
S.C.	Medical College of South Carolina, Charleston	4	2	—	—	—	—	2	—
S.Dak.	University of South Dakota, Vermillion	4	—	—	—	2	—	—	2
Tenn.	University of Tennessee, Knoxville	9	2	2	1	1	1	1	1
	Vanderbilt University, Nashville	7	—	3	—	1	—	3	—
Tex.	Baylor University, Waco	7	—	1	—	2	—	—	4
	Texas A. & M. University, College Station	4	—	4	—	—	—	—	—
	University of Houston, Houston	2	—	—	2	—	—	—	—
	University of Texas, Austin	23	5	11	—	5	—	2	—
Utah	Brigham Young University, Provo	2	—	—	—	2	—	—	—
	University of Utah, Salt Lake City	5	1	—	—	2	—	2	—
	Utah State University, Logan	1	—	1	—	—	—	—	—

See footnotes at end of table.

Table 21. LOCATION OF SCHOOLS CONFERRING DOCTOR'S DEGREES IN THE BASIC MEDICAL SCIENCES AND NUMBER OF GRADUATES: 1966-67—Continued

Location	School	Total basic medical sciences	Anatomy [1]	Biochemistry	Biophysics	Microbiology [2]	Pathology	Pharmacology	Physiology
Vt.	University of Vermont and State Agricultural College, Burlington	3	—	1	—	1	—	1	—
Va.	Medical College of Virginia, Richmond	6	1	—	1	—	—	2	2
Wash.	University of Washington, Seattle	20	1	5	4	2	2	3	3
	Washington State University, Pullman	3	—	—	—	3	—	—	—
W. Va.	West Virginia University, Morgantown	14	—	5	—	4	—	4	1
Wis.	Marquette University, Milwaukee	8	—	—	—	—	1	5	2
	University of Wisconsin, Madison	43	1	25	1	14	—	—	2

[1] Includes histology, cytology, and embryology.

[2] Includes bacteriology, virology, mycology, and parasitology.

Source: National Institutes of Health: *Resources for Biomedical Research and Education Report No. 18.* "Trend in Graduate Enrollment and Ph.D. Output in Scientific Fields, 1960–61 Through 1967–68." Office of Resources Analysis, National Institutes of Health. U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969.

Table 22. LOCATION OF SCHOOLS CONFERRING DOCTOR'S DEGREES IN BIOSCIENCES (OTHER THAN BASIC MEDICAL) AND NUMBER OF GRADUATES: 1966-67

Location	School	Total biosciences	Biology	Botany	Entomology	Genetics	Plant pathology	Zoology	All others [1]
	Total, all schools	1,216	262	171	144	87	90	271	191
Ala.	Auburn University, Auburn	10	—	2	4	—	—	4	—
	University of Alabama, University	1	1	—	—	—	—	—	—
Ariz.	Arizona State University, Tempe	7	—	3	—	—	—	4	—
	University of Arizona, Tucson	12	—	—	1	—	2	9	—
Ark.	Arkansas State University, State College	2	—	—	—	—	—	2	—
	University of Arkansas, Fayetteville	3	—	—	—	1	—	2	—
Calif.	California Institute of Technology, Pasadena	2	2	—	—	—	—	—	—
	Claremont Graduate School, Claremont	1	—	1	—	—	—	—	—
	Loma Linda University, Loma Linda	1	1	—	—	—	—	—	—
	Stanford University, Stanford	21	20	—	—	1	—	—	—
	University of California, Berkeley	54	—	6	18	1	4	17	8
	University of California, Davis	44	—	2	6	13	8	3	12
	University of California, Irvine	1	1	—	—	—	—	—	—
	University of California, Los Angeles	11	—	—	—	—	—	11	—
	University of California, Riverside	12	—	—	5	—	5	—	2
	University of California, San Diego	4	1	—	—	—	—	—	3
	University of California, San Francisco	1	—	—	—	—	—	—	1
	University of California, Santa Barbara	11	11	—	—	—	—	—	—
	University of California, Santa Cruz	1	1	—	—	—	—	—	—
	University of Southern California, Los Angeles	4	4	—	—	—	—	—	—
Colo.	Colorado State College, Greeley	1	—	—	—	—	—	1	—
	Colorado State University, Fort Collins	14	—	6	—	—	—	8	—
	University of Colorado, Boulder	10	—	4	—	—	—	6	—
Conn.	University of Connecticut, Storrs	9	—	—	2	—	—	—	7
	Yale University, New Haven	9	9	—	—	—	—	—	—
Del.	University of Delaware, Newark	6	6	—	—	—	—	—	—
D.C.	Catholic University of America, Washington	5	—	1	1	—	—	1	2
	Georgetown University, Washington	1	1	—	—	—	—	—	—
	George Washington University, Washington	3	2	—	—	—	—	1	—
	Howard University, Washington	1	—	—	—	—	—	1	—
Fla.	Florida State University, Tallahassee	8	—	—	—	—	—	—	8
	University of Florida, Gainesville	9	—	3	4	—	1	1	—
	University of Miami, Coral Gables	18	2	—	—	—	—	5	11
Ga.	Emory University, Atlanta	9	9	—	—	—	—	—	—
	University of Georgia, Athens	11	—	5	—	—	3	3	—
Hawaii	University of Hawaii, Honolulu	2	—	2	—	—	—	—	—
Ill.	Northwestern University, Evanston	2	2	—	—	—	—	—	—
	Southern Illinois University, Carbondale	3	—	2	—	—	—	1	—
	University of Chicago, Chicago	12	—	2	—	—	—	3	7
	University of Illinois, Urbana	20	1	4	4	2	6	3	—
Ind.	Indiana University, Bloomington	13	—	6	—	1	—	6	—
	Purdue University, Lafayette	34	—	—	8	—	1	—	25
	University of Notre Dame, Notre Dame	3	3	—	—	—	—	—	—
Iowa	Iowa State University of Science and Technology, Ames	24	—	6	6	1	3	3	5
	University of Iowa, Iowa City	6	—	4	—	—	—	2	—
Kans.	Kansas State University of Agriculture and Applied Science, Manhattan	17	—	1	9	1	5	1	—
	University of Kansas, Lawrence	13	—	6	3	—	—	4	—
Ky.	University of Louisville, Louisville	6	4	2	—	—	—	—	—

See footnotes at end of table.

Table 22. LOCATION OF SCHOOLS CONFERRING DOCTOR'S DEGREES IN BIOSCIENCES (OTHER THAN BASIC MEDICAL) AND NUMBER OF GRADUATES: 1966-67—Continued

Location	School	Total biosciences	Biology	Botany	Entomology	Genetics	Plant pathology	Zoology	All others [1]
La	Louisiana State University, Baton Rouge	18	—	1	8	—	5	4	—
	Tulane University of Louisiana, New Orleans	7	7	—	—	—	—	—	—
Md	Johns Hopkins University, Baltimore	7	—	—	—	4	—	—	3
	University of Maryland, College Park	8	—	2	1	—	—	3	2
Mass	Boston College, Chestnut Hill	2	2	—	—	—	—	—	—
	Boston University, Boston	6	6	—	—	—	—	—	—
	Clark University, Worcester	5	5	—	—	—	—	—	—
	Harvard University, Cambridge	18	18	—	—	—	—	—	—
	Massachusetts Institute of Technology, Cambridge	25	15	—	—	—	—	—	10
	Smith College, Northampton	1	—	1	—	—	—	—	—
	Tufts University, Medford	1	1	—	—	—	—	—	—
	University of Massachusetts, Amherst	13	—	2	2	—	—	9	—
Mich	Michigan State University, East Lansing	10	—	7	—	—	—	3	—
	University of Michigan, Ann Arbor	15	—	4	—	2	—	9	—
	Wayne State University, Detroit	1	1	—	—	—	—	—	—
Minn	University of Minnesota, Minneapolis	34	—	2	2	14	8	4	4
Miss	Mississippi State University, State College	4	—	—	3	—	—	1	—
	University of Southern Mississippi, Hattiesburg	2	—	—	—	—	—	2	—
Mo	St. Louis University, St. Louis	1	1	—	—	—	—	—	—
	University of Missouri, Columbia	9	—	3	4	1	—	1	—
	Washington University, St. Louis	2	2	—	—	—	—	—	—
Mont	Montana State University, Missoula	11	—	4	1	2	—	4	—
	University of Montana, Helena	5	—	1	—	—	—	4	—
Nebr	University of Nebraska, Lincoln	16	—	5	4	—	—	2	5
N.H	University of New Hampshire, Durham	6	—	4	—	—	—	2	—
N.J	Princeton University, Princeton	3	3	—	—	—	—	—	—
	Rutgers, The State University, New Brunswick	13	—	4	1	—	2	6	—
N.Mex	University of New Mexico, Albuquerque	1	1	—	—	—	—	—	—
N.Y	Columbia University, New York	24	7	8	—	—	—	7	2
	Cornell University, Ithaca	35	8	2	10	6	4	—	5
	CUNY Graduate Center, New York	3	—	—	—	2	—	—	1
	Fordham University, Bronx	5	5	—	—	—	—	—	—
	New York University, New York	23	23	—	—	—	—	—	—
	Rockefeller University, New York	4	—	—	—	1	—	—	3
	St. Bonaventure University, St. Bonaventure	4	4	—	—	—	—	—	—
	St. John's University, Jamaica	7	7	—	—	—	—	—	—
	SUNY College of Forestry, Syracuse	6	—	4	1	—	—	1	—
	SUNY State University at Buffalo, Buffalo	9	9	—	—	—	—	—	—
	Syracuse University, Syracuse	2	—	—	—	—	—	2	—
	University of Rochester, Rochester	11	5	—	—	—	—	—	6
	Yeshiva University, New York	2	—	—	—	—	—	—	2
N.C	Duke University, Durham	11	—	3	—	—	—	8	—
	North Carolina State University at Raleigh, Raleigh	26	—	2	5	9	7	1	2
	University of North Carolina, Chapel Hill	8	—	4	—	—	—	4	—
N.D	North Dakota State University, Fargo	2	—	—	1	—	1	—	—
Ohio	Case Western Reserve University, Cleveland	7	6	—	—	—	—	—	1
	Kent State University, Kent	2	1	—	—	—	—	—	1
	Ohio State University, Columbus	18	—	5	4	—	1	7	1
	University of Cincinnati, Cincinnati	5	3	—	—	—	—	2	—
Okla	Oklahoma State University, Stillwater	16	—	6	3	2	—	5	—
	University of Oklahoma, Norman	4	—	3	—	—	—	1	—

See footnotes at end of table.

Table 12. LOCATION OF SCHOOLS CONFERRING DOCTOR'S DEGREES IN BIOSCIENCES (OTHER THAN BASIC MEDICAL) AND NUMBER OF GRADUATES: 1966-67—Continued

Location	School	Total biosciences	Biology	Botany	Entomology	Genetics	Plant pathology	Zoology	All others [1]
Oreg	Oregon State University, Corvallis	18	—	6	3	1	—	8	—
	University of Oregon, Eugene	9	9	—	—	—	—	—	—
Pa	Bryn Mawr College, Bryn Mawr	1	1	—	—	—	—	—	—
	Hahnemann Medical College and Hospital, Philadelphia	4	—	—	—	4	—	—	—
	Lehigh University, Bethlehem	3	3	—	—	—	—	—	—
	Pennsylvania State University, University Park	12	—	1	1	1	3	6	—
	Philadelphia College of Pharmacy and Science, Philadelphia	1	1	—	—	—	—	—	—
	Temple University, Philadelphia	3	3	—	—	—	—	—	—
	University of Pennsylvania, Philadelphia	14	—	1	—	—	—	8	5
	University of Pittsburgh, Pittsburgh	3	—	—	—	—	—	—	3
R.I	Brown University, Providence	7	7	—	—	—	—	—	—
	University of Rhode Island, Kingston	4	4	—	—	—	—	—	—
S.C	Clemson University, Clemson	4	—	—	4	—	—	—	—
	University of South Carolina, Columbia	2	2	—	—	—	—	—	—
S.Dak	University of South Dakota, Vermillion	3	—	—	—	—	—	3	—
Tenn	University of Tennessee, Knoxville	6	—	3	—	—	—	1	2
	Vanderbilt University, Nashville	2	2	—	—	—	—	—	—
Tex	Baylor University, Waco	1	—	—	—	—	—	—	1
	Rice University, Houston	1	1	—	—	—	—	—	—
	Texas A. & M. University, College Station	23	1	—	6	4	1	2	9
	Texas Woman's University, Denton	3	—	—	—	—	—	—	3
	University of Houston, Houston	3	3	—	—	—	—	—	—
	University of Texas, Austin	23	1	6	—	—	—	16	—
Utah	Brigham Young University, Provo	1	—	1	—	—	—	—	—
	University of Utah, Salt Lake City	7	1	—	3	1	—	2	—
	Utah State University, Logan	4	—	—	1	—	—	3	—
Va	University of Virginia, Charlottesville	1	1	—	—	—	—	—	—
	Virginia Polytechnic Institute, Blacksburg	6	—	—	1	—	4	1	—
Wash	University of Washington, Seattle	30	—	5	—	4	—	7	14
	Washington State University, Pullman	12	—	2	—	1	7	1	1
W. Va	West Virginia University, Morgantown	3	1	—	—	—	1	1	—
Wis	University of Wisconsin, Madison	46	—	1	4	7	8	13	13
Wyo	University of Wyoming, Laramie	5	—	—	—	—	—	5	—
P.R	University of Puerto Rico, Rio Piedros	1	—	—	—	—	—	—	1

[1] Includes ecology, nutrition, plant physiology, and all others.

Source: National Institutes of Health: *Resources for Biomedical Research and Education, Report No. 18.* "Trends in Graduate Enrollment and Ph.D. Output in Scientific Fields, 1960-61 Through 1967-68." Office of Resources Analysis, National Institutes of Health. U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969

Table 23. LOCATION OF SCHOOLS CONFERRING DOCTOR'S DEGREES IN PHYSICAL SCIENCES AND NUMBER OF GRADUATES: 1966-67

Location	School	Total physical sciences	Chemistry	Physics	All others [1]
	Total, all schools	3,462	1,700	1,183	579
Ala.	Auburn University, Auburn	3	3	—	—
	University of Alabama, University	11	8	3	—
Alaska	University of Alaska, College	1	—	—	1
Ariz.	Arizona State University, Tempe	12	8	4	—
	University of Arizona, Tucson	38	16	5	17
Ark.	University of Arkansas, Fayetteville	8	4	4	—
Calif.	California Institute of Technology, Pasadena	57	16	35	6
	San Diego State College, San Diego	1	1	—	—
	Stanford University, Stanford	78	20	31	27
	University of California, Berkeley	137	51	63	23
	University of California, Davis	10	7	3	—
	University of California, Irvine	7	6	1	—
	University of California, Los Angeles	60	14	25	21
	University of California, Riverside	19	13	4	2
	University of California, San Diego	31	7	12	12
	University of California, San Francisco	2	—	—	2
	University of California, Santa Barbara	8	5	3	—
	University of the Pacific, Stockton	3	3	—	—
	University of Southern California, Los Angeles	14	4	5	5
	U.S. Naval Postgraduate School, Monterey	6	1	5	—
Colo.	Colorado School of Mines, Golden	1	—	—	1
	Colorado State University, Fort Collins	5	1	1	3
	University of Colorado, Boulder	32	15	5	12
	University of Denver, Denver	5	2	—	3
Conn.	University of Connecticut, Storrs	11	7	2	2
	Yale University, New Haven	61	20	30	11
Del.	University of Delaware, Newark	18	13	5	—
D.C.	American University, Washington	1	—	1	—
	Catholic University of America, Washington	19	5	14	—
	Georgetown University, Washington	7	1	5	1
	George Washington University, Washington	4	2	1	1
	Howard University, Washington	7	5	2	—
Fla.	Florida State University, Tallahassee	27	13	8	6
	University of Florida, Gainesville	39	30	9	—
	University of Miami, Coral Gables	2	1	—	1
Ga.	Emory University, Atlanta	4	4	—	—
	Georgia Institute of Technology, Atlanta	24	16	8	—
	University of Georgia, Athens	10	7	3	—
Hawaii	University of Hawaii, Honolulu	6	2	—	4
Idaho	University of Idaho, Moscow	2	2	—	—
Ill.	Illinois Institute of Technology, Chicago	24	17	7	—
	Loyola University, Chicago	4	4	—	—
	Northwestern University, Evanston	48	35	8	5
	University of Chicago, Chicago	55	17	29	9
	University of Illinois, Urbana	115	56	45	14
Ind.	Indiana University, Bloomington	36	22	3	11
	Purdue University, Lafayette	66	50	16	—
	University of Notre Dame, Notre Dame	27	14	13	—
Iowa	Iowa State University of Science and Technology, Ames	60	34	22	4
	University of Iowa, Iowa City	26	18	6	2
Kans.	Kansas State University of Agriculture and Applied Science, Manhattan	15	13	2	—
	University of Kansas, Lawrence	34	22	3	9
Ky.	University of Kentucky, Lexington	10	6	4	—
	University of Louisville, Louisville	6	6	—	—

See footnotes at end of table.

Table 23. LOCATION OF SCHOOLS CONFERRING DOCTOR'S DEGREES IN PHYSICAL SCIENCES AND NUMBER OF GRADUATES: 1966-67—Continued

Location	School	Total physical sciences	Chemistry	Physics	All others [1]
La	Louisiana State University and A. & M. College, Baton Rouge	28	14	8	6
	Tulane University of Louisiana, New Orleans	11	8	2	1
Maine	University of Maine, Orono	4	4	—	—
Md	Johns Hopkins University, Baltimore	28	12	11	5
	University of Maryland, College Park	49	19	27	3
Mass	Boston College, Chestnut Hill	1	—	1	—
	Boston University, Boston	12	6	4	2
	Brandeis University, Waltham	11	5	6	—
	Clark University, Worcester	2	2	—	—
	Harvard University, Cambridge	69	30	23	16
	Lowell Technological Institute, Lowell	3	2	1	—
	Massachusetts College of Pharmacy, Boston	2	—	—	2
	Massachusetts Institute of Technology, Cambridge	105	40	51	14
	Northeastern University, Boston	12	8	4	—
	Tufts University, Medford	6	1	5	—
	University of Massachusetts, Amherst	18	16	—	2
	Worcester Polytechnic Institute, Worcester	1	1	—	—
Mich	Michigan State University, East Lansing	32	14	13	5
	University of Detroit, Detroit	2	2	—	—
	University of Michigan, Ann Arbor	56	17	23	16
	Wayne State University, Detroit	35	24	11	—
Minn	University of Minnesota, Minneapolis	44	25	15	4
Miss	Mississippi State University, State College	1	1	—	—
	University of Mississippi, University	8	3	—	5
Mo	St. Louis University, St. Louis	16	9	4	3
	University of Missouri, Columbia	31	14	9	3
	Washington University, St. Louis	11	4	7	—
Mont	Montana State University, Missoula	3	2	1	—
	University of Montana, Helena	4	—	—	4
Nebr	University of Nebraska, Lincoln	15	10	3	2
Nev	University of Nevada, Reno	2	—	1	1
N.H	University of New Hampshire, Durham	17	16	1	—
N.J	Princeton University, Princeton	53	19	18	16
	Rutgers, The State University, New Brunswick	46	17	13	16
	Seton Hall University, South Orange	6	6	—	—
	Stevens Institute of Technology, Hoboken	7	3	4	—
N.Mex	New Mexico State University, University Park	6	—	6	—
	University of New Mexico, Albuquerque	14	6	4	4
N.Y	Adelphi University, Long Island	8	3	5	—
	Clarkson College of Technology, Potsdam	4	2	2	—
	Columbia University, New York	79	25	32	22
	Cornell University, Ithaca	65	25	36	4
	CUNY Graduate Center, New York	5	4	1	—
	Fordham University, Bronx	11	8	3	—
	New York University, New York	42	15	21	6
	Polytechnic Institute of Brooklyn, Brooklyn	30	27	3	—
	Rensselaer Polytechnic Institute, Troy	53	14	15	24
	Rockefeller University, New York	1	—	1	—
	St. John's University, Jamaica	6	6	—	—
	SUNY College of Forestry, Syracuse	8	8	—	—
	SUNY State University, Albany	1	1	—	—
	SUNY State University, Buffalo	20	12	8	—
	SUNY State University, Stony Brook	5	4	1	—
	Syracuse University, Syracuse	25	9	10	6
	University of Rochester, Rochester	34	13	16	5
	Yeshiva University, New York	8	—	8	—

See footnotes at end of table.

Table 23. LOCATION OF SCHOOLS CONFERRING DOCTOR'S DEGREES IN PHYSICAL SCIENCES AND NUMBER OF GRADUATES: 1966-67—Continued

Location	School	Total physical sciences	Chemistry	Physics	All others [1]
N.C	Duke University, Durham	17	8	9	—
	North Carolina State University at Raleigh, Raleigh	4	1	3	—
	University of North Carolina, Chapel Hill	20	14	5	1
N.Dak	North Dakota State University, Fargo	12	9	—	3
	University of North Dakota, Grand Forks	2	2	—	—
Ohio	Case Western Reserve University, Cleveland	38	24	12	2
	Kent State University, Kent	4	4	—	—
	Ohio State University, Columbus	55	36	9	10
	Ohio University, Athens	14	4	10	—
	University of Akron, Akron	10	10	—	—
	University of Cincinnati, Cincinnati	15	15	—	—
Okla	Oklahoma State University, Stillwater	17	14	3	—
	University of Oklahoma, Norman	25	12	7	6
Oreg	Oregon State University, Corvallis	28	16	1	11
	University of Oregon, Eugene	15	7	8	—
Pa	Bryn Mawr College, Bryn Mawr	2	1	1	—
	Carnegie-Mellon University, Pittsburgh	23	11	11	1
	Duquesne University, Pittsburgh	2	2	—	—
	Lehigh University, Bethlehem	12	6	6	—
	Pennsylvania State University, University Park	65	23	19	23
	Temple University, Philadelphia	11	8	3	—
	University of Pennsylvania, Philadelphia	48	24	24	—
	University of Pittsburgh, Pittsburgh	28	16	9	3
R.I	Brown University, Providence	24	8	11	5
	Providence College, Providence	1	1	—	—
	University of Rhode Island, Kingston	9	4	—	5
S.C	Clemson University, Clemson	8	5	3	—
	University of South Carolina, Columbia	6	4	2	—
S.Dak	University of South Dakota, Vermillion	1	1	—	—
Tenn	University of Tennessee, Knoxville	24	8	11	5
	Vanderbilt University, Nashville	14	8	6	—
Tex	Baylor University, Waco	5	5	—	—
	North Texas State University, Denton	1	1	—	—
	Rice University, Houston	39	12	13	14
	Texas A. & M. University, College Station	27	9	10	8
	Texas Christian University, Fort Worth	4	2	2	—
	University of Houston, Houston	9	7	2	—
	University of Texas, Austin	52	23	19	10
Utah	Brigham Young University, Provo	4	1	3	—
	University of Utah, Salt Lake City	35	14	8	13
	Utah State University, Logan	6	5	1	—
Vt	University of Vermont and State Agricultural College, Burlington	4	4	—	—
Va	College of William and Mary, Williamsburg	1	—	1	—
	Medical College of Virginia, Richmond	1	—	—	1
	University of Virginia, Charlottesville	22	10	11	1
	Virginia Polytechnic Institute, Blacksburg	14	7	7	—
Wash	University of Washington, Seattle	41	24	6	11
	Washington State University, Pullman	15	8	5	2
W.Va	West Virginia University, Morgantown	8	5	2	1
Wis	Lawrence University, Appleton	15	13	2	—
	University of Wisconsin, Madison	106	56	25	25
Wyo	University of Wyoming, Laramie	6	5	—	1

[1] Includes general physical sciences, astronomy, metallurgy, meteorology, pharmaceutical chemistry, geology, geophysics, oceanography, and all other earth and physical sciences.

Source: National Institutes of Health: *Resources for Biomedical Research and Education, Report No. 18.* "Trends in Graduate Enrollment and Ph.D. Output in Scientific Fields, 1960-61 Through 1967-68." Office of Resources Analysis, National Institutes of Health. U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969.

CHAPTER 5

Biomedical Engineering*

Biomedical engineering involves the application of the principles and practices of engineering science to biomedical research and health care. A relatively new field, it serves and supports life science research and diagnosis, therapy, and prevention of human disease and disorder. It is built upon the collaboration of life scientists and clinical practitioners with their professional counterparts from the physical sciences and technology. Typical activities in this field include the development of new instruments for use in research and patient care, the invention and perfection of orthotic and prosthetic devices, and the application of physical systems analysis, computer technology, and engineering methods to problems in the living context. This work is being conducted in academic institutions, hospitals, federal and private research laboratories, and in a variety of manufacturing and service industries.

According to estimates made by the Foundation for Medical Technology and the Biomedical Engineering and Instrumentation Branch of the National Institutes of Health (NIH), approximately 3,000 persons were employed as biomedical engineers in 1967. This number must be considered somewhat arbitrary because of the difficulties inherent in defining the present scope of the field.

The minimum educational requirement for biomedical engineers is a bachelor's degree in engineering with some training and experience in the biomedical sciences. A number of universities throughout the country offer formal curricula to prepare people to work in the field. Doctoral level training programs in the field of biomedical engineering are supported by the Public Health Service in 21 institutions (table 24). To date, there have been some 120 estimated graduates from these programs. A number of additional graduate and undergraduate courses are now being developed in colleges and junior colleges for specific training in biomedical engineering and related areas of technology.

Biomedical engineering technicians are responsible for constructing, adapting, operating, and maintaining medical devices and instrument systems. These technicians may enter from many diverse fields to use their special skills in this occupation. Persons with special training in plastics, for example, work on repair and replacement materials and the development of artificial organs. (Orthotists and prosthetists who make and fit artificial limbs and braces and electronic technicians who are involved in certain aspects of computer programming and operation are discussed in other chapters of this publication.)

Information on the number of technicians currently employed is not available, but the total is estimated at 6,000 for 1967. This estimate is based on an average of two technicians per engineer, an assumption acceptable to both the Foundation for Medical Technology and the NIH Biomedical Engineering and Instrumentation Branch.

Courses in biomedical engineering technology are being developed by some technical institutes as a two-year program and also to supplement on-the-job training of *biomedical engineering aides*.

*** Parts of this text were prepared by the Public Health Service, National Institutes of Health, Division of Research Services, Biomedical Engineering and Instrumentation Branch—Dr. Lester Goodman, Chief.**

Table 24. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING DOCTORAL PROGRAMS IN BIOMEDICAL ENGINEERING, JULY 1, 1968

Location	Schools [1]	Ownership
	Total, 21 schools [2]	
Calif	California Institute of Technology, Pasadena	Private.
	University of California, Berkeley	Public.
	University of Southern California, Los Angeles	Private.
Conn	University of Connecticut, Storrs	Public.
Ill	Northwestern University, Evanston	Private.
	University of Illinois College of Engineering, Chicago	Public.
Md	Johns Hopkins University, Baltimore	Private.
Mass	Massachusetts Institute of Technology, Cambridge	do.
Mich	University of Michigan, Ann Arbor	Public.
Mo	Washington University, St. Louis	Private.
N.Y	Brooklyn Polytechnic Institute, Brooklyn	do.
	New York University School of Medicine, New York	do.
	University of Rochester, Rochester	do.
N.C	University of North Carolina, Chapel Hill	Public.
Ohio	Case Institute of Technology, Cleveland	Private.
Pa	Carnegie Institute of Technology, Pittsburgh	do.
	Drexel Institute of Technology, Philadelphia	do.
	University of Pennsylvania, Philadelphia	do.
Tex	Baylor University, Houston	do.
Wash	University of Washington, Seattle	Public.
Wis	Marquette University, Milwaukee	Private.

[1] Only those schools which have training programs supported by U.S. Public Health Service.
[2] Data not available on number of students and graduates enrolled in these courses.

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Institute of General Medical Sciences.

CHAPTER 6

Chiropractic and Naturopathy

In some States the law authorizes the licensing of "drugless healers." Chiropractors, naturopaths, and allied practitioners thus may be identified through the licenses now in effect. Probably fewer than 18,000 individuals were in practice in 1967—the latest year data are available, although how reliable this estimate is cannot be stated.

Chiropractors

Chiropractic is a system of mechanical therapeutics based on the belief that the nervous system largely determines the state of health and that any interference with this system impairs normal functions and lowers the body's resistance to disease. Chiropractors treat their patients primarily by specific adjustment of parts of the body, especially the spinal column. Chiropractic as a system of healing does not include the use of drugs or surgery.

About 20,000 *chiropractors* were licensed at the end of 1967 in the United States according to the best estimates provided by the American Chiropractic Association (*17*). This represents a slight increase over the 1965 estimate (table 25). Of these, perhaps 15,000 to 17,000 are actively engaged in practice. The 1950 and 1960 Censuses of Population reported 13,091 and 14,360 chiropractors, respectively, in the civilian labor force (*18*).

The American Chiropractors Association has 7,300 members and the International Chiropractors Association has 4,000 members.

The greatest number of chiropractors are in independent private practice. Some are employed by chiropractic schools or clinics, or as salaried assistants to established practitioners of chiropractic.

In 1969, chiropractors were licensed in 48 states and the District of Columbia. Most States require the successful completion of a 4-year chiropractic course leading to a Doctor of Chiropractic (D.C.). In addition, 33 States require 2 years of college and 2 States require 1 year as a prerequisite for entrance into a school of chiropractic, while four States require a 1-year internship. A basic science certificate based on an examination is mandatory in 27 States before chiropractors are permitted to take licensing examinations.

The trend in numbers of graduates since 1961 is shown in table 26. In 1967–68, the 11 schools recognized by two chiropractic associations graduated 600 students with the degree of Doctor of Chiropractic (D.C.) (table 27).

Naturopaths

Naturopathy is a school of healing employing a combination of nature's forces such as air, light, water, vibration, heat, electricity, dietetics, and massage. It does not include the use of drugs, surgery, and X-ray or radiation (except for diagnostic purposes). Many *naturopaths* are former chiropractors and use chiropractic treatment.

Probably fewer than 1,000 of these "healers" are currently licensed. Findings from a 1965–66 survey of State licensing of all occupations in the health field show the following licenses in effect: 100 in Arizona (53 of which are for practitioners within the State), 66 in California, 47 in Connecticut (29 of which are for practitioners within the State), 136 in Florida (apparently all for practitioners within the State), 14 in Hawaii (13 of which are for practitioners within the State), 148 in Oregon (121 of which are practitioners within the State), 42 in Utah, and 107 in Washington (*19*). A glance at the classified directories for some large cities across the Nation indicates that this is an undercount and that there are naturopathic physicians in almost half of the States. The National Association of Naturopathic Physicians (170 members) is composed of naturopaths, naturopath-chiropractors and chiropractors.

A 1958 investigation showed five institutions that taught naturopathy and/or granted degrees (*20*). By 1969, however, only one of these schools was in existence—The National College of Naturopathic Medicine, Seattle, Washington.

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(17) Higley, H. G.: *Chiropractic Population in The United States 1963–1967*. American Chiropractic Association, December 1968.

(18) Prindle, R. A., and Pennell, M. Y.: Industry and occupation data from 1960 census, by State. *Health Manpower Source Book 17*. PHS Pub. No. 263, Section 17. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1963.

(19) National Center for Health Statistics. *State, Licensing of Health Occupations*. PHS Pub. No. 1758. Public Health Service. Washington. U. S. Government Printing Office, 1967.

(20) Bureau of Economic and Business Research: *Survey of Naturopathic Schools*. University of Utah, December 1958.

Table 25. LOCATION OF LICENSED CHIROPRACTORS IN RELATION TO POPULATION: DEC. 31, 1965

Location	Civilian population in thousands	Number of licensed chiropractors resident in State [1]	Chiropractors per 100,000 population
United States	193,780	19,131	10
Alabama	3,478	260	8
Alaska	233	12	5
Arizona	1,581	180	11
Arkansas	1,946	135	7
California	18,431	4,100	22
Colorado	1,917	167	9
Connecticut	2,866	123	4
Delaware	506	21	4
District of Columbia	790	[2] 25	3
Florida	5,799	616	11
Georgia	4,333	[2] 222	7
Hawaii	673	17	3
Idaho	693	66	10
Illinois	10,721	[2] 653	6
Indiana	4,941	277	6
Iowa	2,759	588	21
Kansas	2,240	552	25
Kentucky	3,136	482	15
Louisiana	3,574	----	----
Maine	962	53	6
Maryland	3,539	204	6
Massachusetts	5,365	[3]	----
Michigan	8,448	762	9
Minnesota	3,567	497	14
Mississippi	2,307	----	----
Missouri	4,523	1,214	27
Montana	692	88	13
Nebraska	1,427	86	6
Nevada	424	57	13
New Hampshire	672	185	28
New Jersey	6,843	411	6
New Mexico	993	90	9
New York	18,169	1,254	7
North Carolina	4,871	258	5

See footnotes at end of table.

Table 25. LOCATION OF LICENSED CHIROPRACTORS IN RELATION TO POPULATION: DEC. 31, 1965—Continued

Location	Civilian population in thousands	Number of licensed chiropractors resident in State [1]	Chiropractors per 100,000 population
North Dakota	631	76	12
Ohio	10,344	[4] 852	8
Oklahoma	2,438	374	15
Oregon	1,968	255	13
Pennsylvania	11,582	[2] 886	8
Rhode Island	873	[5] 48	6
South Carolina	2,510	174	7
South Dakota	673	[2] 117	17
Tennessee	3,833	[4] 183	5
Texas	10,534	1,274	12
Utah	1,003	116	12
Vermont	411	48	12
Virginia	4,300	[6] 74	2
Washington	2,983	279	9
West Virginia	1,808	30	2
Wisconsin	4,163	533	13
Wyoming	315	57	18

[1] Active and inactive.
[2] Data as of December 1964.
[3] Data not available since Massachusetts only licensed chiropractors since 1966.
[4] Data as of January 1965.
[5] Data as of December 1963.
[6] Estimated by Public Health Service.

Sources: Higley, H. G.: *Chiropractic Licentiates.* The ACA Journal of Chiropractic, January 1968.
National Center for Health Statistics: *State Licensing of Health Occupations.* PHS Pub. No. 1758. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968.
U.S. Bureau of the Census: Estimates of the population of States: July 1, 1966. *Current Population Reports,* Series P-25, No. 380. November 1967.

Table 26. GRADUATES OF CHIROPRACTIC SCHOOLS: 1961 THROUGH 1968

Location	School	1961	1962	1963	1964	1965	1966	1967	1968
	Total, all schools	665	646	597	564	627	651	687	589
	Schools approved by the American Chiropractic Association, total [1]	343	345	331	292	271	293	349	257
Calif.	Los Angeles College of Chiropractic, Glendale	52	55	49	39	41	43	46	56
Ill.	National College of Chiropractic, Lombard	62	55	51	43	39	41	75	64
Ind.	Lincoln Chiropractic College, Indianapolis	53	38	40	50	48	51	35	29
Minn.	Northwestern College of Chiropractic, Minneapolis	30	19	15	17	13	9	8	12
Mo.	Logan College of Chiropractic, St. Louis	72	76	72	54	42	50	69	54
N.Y.	Chiropractic Institute of New York, New York [2]	41	57	52	33	38	40	56	—
	Columbia Institute of Chiropractic, New York [3]	14	31	29	36	30	48	42	26
Oreg.	Western States College of Chiropractic, Portland [4]	5	6	9	10	8	7	5	[5] 4
Tex.	Texas Chiropractic College, Pasadena	14	8	14	10	12	4	13	12
	Schools approved by Chiropractic Education Commission of the International Chiropractors Association, total [1]	322	301	266	272	356	358	338	332
Calif.	Cleveland Chiropractic College, Los Angeles	31	37	34	29	36	46	50	50
Iowa	Palmer College of Chiropractic, Davenport	246	230	212	211	279	275	257	248
Mo.	Cleveland Chiropractic College, Kansas City	45	34	20	32	41	37	31	34

[1] Schools approved in 1968 but may not have been approved for earlier years.
[2] Closed in 1968.
[3] Approved by both agencies.
[4] An affiliate but not approved.
[5] Estimated.

Source: The American Chiropractic Association and the International Chiropractors Association.

Table 27. LOCATION AND OWNERSHIP OF CHIROPRACTIC SCHOOLS AND NUMBER OF STUDENTS AND GRADUATES: 1967-68

Location	School [1]	Students	Graduates
	Total, 11 schools	2,449	589
	Schools approved by the American Chiropractic Association		
Calif.	Los Angeles College of Chiropractic, Glendale	233	56
Ill.	National College of Chiropractic, Lombard	302	64
Ind.	Lincoln Chiropractic College, Indianapolis	124	29
Minn.	Northwestern College of Chiropractic, Minneapolis	50	12
Mo.	Logan College of Chiropractic, St. Louis	184	54
N.Y.	Columbia Institute of Chiropractic, New York	154	26
Oreg.	Western States College of Chiropractic, Portland [2]	[3] 25	[3] 4
Tex.	Texas Chiropractic College, Pasadena	103	12
	Schools approved by the Chiropractic Education Commission of the International Chiropractors Association		
Calif.	Cleveland Chiropractic College, Los Angeles	175	50
Iowa	Palmer College of Chiropractic, Davenport	915	248
Mo.	Cleveland Chiropractic College, Kansas City	184	34

[1] All private schools.
[2] An affiliate but not approved.
[3] Estimated.

Source: The American Chiropractic Association and the International Chiropractors Association.

CHAPTER 7

Clinical Laboratory Services*

An estimated 108,000 persons in several occupations are engaged full or part time in providing services within the clinical laboratory setting, in addition to the physicians who specialize in clinical pathology. (See table 87, ch. 18). Earlier estimates had indicated about 30,000 workers in 1950, 50,000 in 1955, 68,000 in 1960, and upwards of 85,000 in 1965 (table 28).

In order for illness to be diagnosed and treated, clinical laboratory personnel must embrace a wide variety of skills associated with different types of education and experience. Nearly half of the individuals are college graduates, with a bachelor's degree or higher. Others are high school or junior college graduates with varying combinations of formal education, commercial or vocational school training, apprenticeship training in a clinical laboratory, and/or experience, which enables them to work as technicians or assistants.

Statistics on the numbers of clinical laboratory personnel employed in 1968 by location and by type of employer are lacking. The 1966 hospital survey indicated that about 75,000 such persons were employed in hospitals as of April 1966: 54,500 technologists, including persons with that job title but without a college degree; 1,600 cytotechnologists; 3,900 histologic technicians; and 14,600 laboratory assistants. Also, there are about 4,000 laboratory workers employed by State and local health departments (table 9, Introduction) and about 10,000 employed by private independent laboratories. Of the approximately 25,000 or so persons (other than nurses) who perform some laboratory work in physicians' offices, perhaps 10,000 can be considered as laboratory workers. Relatively small numbers—1,000 to 2,000—work for industry and independent research organizations.

Clinical Laboratory Scientist

Approximately 4,000 scientists with graduate degrees in chemistry, microbiology, or other biological sciences were engaged in the performance of clinical laboratory services in 1968. An academic degree in a specific science followed by a period of work experience in a laboratory is the usual course of entry into this field.

Most of these scientists are employed in clinical laboratories directed by pathologists or other physicians. Others direct their own laboratories or work in these independent laboratories.

The American Association of Clinical Chemists (AACC) had about 1,700 members in 1968. In addition, there are qualified *chemists* who are not AACC members, including some who are affiliated with the American Society of Biological Chemists and the American Chemical Society. The American Board of Clinical Chemistry examines and certifies clinical chemists with a doctorate and extensive experience. The National Registry in Clinical Chemistry (NRCC) accredits clinical chemists with a doctorate, masters, or bachelors degree and who have the experience to meet qualifications set by the Registry.

The American Academy of Microbiology (740 members in 1968) is the professional organization of *microbiologists* at the doctoral level. One of its committees is the American Board of Microbiology which certifies those persons with a doctor's degree.

The Board of Registry of Medical Technologists of the American Society of Clinical Pathologists offers specialist certification following an examination, in blood banking, chemistry, microbiology, cytotechnology and hematology. Examinations are open to persons with a master's or doctor's degree and 3 years of experience in that field in an acceptable medical laboratory.

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* This chapter was prepared for the 1968 edition by the Public Health Service, Bureau of Health Professions Education and Manpower Training, Division of Allied Health Manpower, and updated by the National Center for Health Statistics, Division of Health Resources Statistics.

Clinical Laboratory Technologist

Technologists, as used here, means (a) persons with a bachelor's degree in chemistry or a biological science, and (b) persons registered with the Board of Registry of Medical Technologists of the American Society of Clinical Pathologists—MT(ASCP)'s. The number active in 1968 was estimated at 43,000, or about 10 times the staff of scientists in the clinical laboratories.

The number of college graduates—other than those certified as MT(ASCP)—who were employed in a clinical laboratory in 1968 probably exceeded 4,000. Certification is open to technologists who have the requisite training and experience to meet qualifications set by the National Registry in Clinical Chemistry, the National Registry of Microbiologists (a subcommittee of the American Board), and the Board of Registry of Medical Technologists (ASCP). Other registries of *medical technologists* may also include persons with a baccalaureate in one of the sciences.

An estimated 38,400 *MT(ASCP)'s* were engaged in 1968 in the performance of chemical, microscopic, bacteriologic, and other tests under the supervision of a pathologist or other physician (table 29). Some of them serve as laboratory supervisors or assist in the training of student medical technologists and other laboratory personnel. The minimum educational requirement for this medical technologist is 3 years of college plus 12 months of specialized training in a school of medical technology approved by the AMA Council on Medical Education in collaboration with the ASCP Board of Schools of Medical Technology. In the academic year 1968–69, more than 5,000 students were admitted to the final year of this program. A total of 3,700 were graduated, most of them also receiving a baccalaureate from an affiliated college or university (tables 30 and 31).

National certification examinations given by the Board of Registry of Medical Technologists (ASCP) enable persons with the education prescribed above and who pass the exams to use the professional designation of MT(ASCP). As of July 1971, baccalaureate degrees will be required of all applicants for the MT(ASCP) certification examination. The same Board certifies persons as technologists in *blood banking*, *chemistry*, *microbiology*, and *nuclear medicine*.

The American Society of Medical Technologists, with a membership of nearly 14,200 in 1969, is the professional organization of medical technologists.

Clinical Laboratory Technician and Assistant

Probably in excess of 61,000 individuals with varying combinations of experience and post high school training were engaged in clinical laboratory work in 1968. Several levels of laboratory jobs have developed over the years for those persons without a college degree. Minimum levels of education and experience have been established for only a few of these positions, such as *cytotechnologist*, *histologic technician*, *certified laboratory assistant*, and *medical laboratory technician*—each of which is described below.

About 2,200 *CT(ASCP)'s* were employed in 1968, having received their training in schools of cytotechnology approved by the AMA Council on Medical Education in collaboration with the ASCP Board of Schools of Medical Technology. These cytotechnologists specialize in screening slides in the search for abnormalities that are warning signs of cancer. Minimum prerequisites include 2 years of college with 12 semester hours in science, 8 of which are in biology. The cytotechnology course provides for 12 months of education, with the second half of this period at an approved school or in an acceptable cytology laboratory. In 1968–69, 388 persons completed their training (tables 32 and 33). Successful completion of national certification examinations given by the Board of Registry of Medical Technologists permits the use of the designation CT(ASCP).

Approximately 3,000 *HT(ASCP)'s* were employed in pathology laboratories in 1968. These histologic technicians specialize in cutting and staining body tissues for microscopic examination. The Board of Registry of Medical Technologists gives limited certification, following examination, to persons with a high school diploma plus 1 year of supervised training in a clinical pathology laboratory. Some hospitals have set up training courses but as yet there is no formal approval of such programs.

Certified laboratory assistants CLA(ASCP) numbered about 4,300 active in 1968. These assistants usually work under the supervision of the medical technologist, performing the simpler laboratory tests and procedures. Graduation from an accredited high school, preferably with ability and interest in science and mathematics—or an equivalency certificate—is required for admission

to a school approved by the AMA Council on Medical Education in collaboration with the Board of Schools of the ASCP and the ASMT. In 1968-69, about 900 students were enrolled in the 12-month course of practical and technical training (tables 34 and 35). Graduates who pass an examination given by the CLA Board may place the letters CLA (ASCP) after their names.

Medical laboratory technicians (MLT) ASCP's are a new level of laboratory personnel. These technicians usually work under the supervision of a medical technologist, performing at a level between the medical technologist and the certified laboratory assistant. Certification is awarded by the board of Registry of the ASCP following the successful completion of an examination. Requirements for certification include either an associate degree from a junior or community college plus supervised training in a clinical pathology laboratory, or graduation from a 12-month military laboratory program with an associate degree or it's equivalent.

With regard to other clinical laboratory technicians and assistants, training and certification requirements differ widely. Several self-established registries for personnel not under general medical auspices have been established.

Table 28. ESTIMATED NUMBER OF EMPLOYED CLINICAL LABORATORY PERSONNEL: 1965, 1967 AND 1968

Occupation and selected certification designations	1965	1967	1968
All occupations [1]	85 to 90,000	100,000	108,000
Scientists [2]	3,500	4,000	4,000
Clinical chemists:			
Chemistry diplomate	290	300	302
Spec C(ASCP)	7	8	11
NRCC		—	410
Microbiologists:			
Microbiology diplomate	457	467	488
Spec M(ASCP)	18	28	29
Other			
Other scientists:			
Spec(ASCP), blood banking	2	3	3
Spec (ASCP), cytotechnology	5	4	4
Other			
Technologists [3]	35,000	40,000	48,000
Medical technologists.			
MT(ASCP)	30,800	35,600	38,400
Other			
Blood banking technologists:			
BB(ASCP)	476	504	549
Other			
Chemistry technologists:			
NRCC		—	100
C(ASCP)	134	156	168
Other			
Microbiology technologists:			
Microbiology diplomate		637	641
M(ASCP)	94	128	138
Other			
Nuclear medical technologists:			
NM(ASCP)	85	115	143
Other			
Technicians and assistants [4]	46,500 to 50,000	56,000	61,000

See footnotes at end of table.

Table 28. ESTIMATED NUMBER OF EMPLOYED CLINICAL LABORATORY PERSONNEL: 1965, 1967 AND 1968—Continued

Occupation and selected certification designations	1965	1967	1968
Cytotechnologists:			
CT(ASCP)	1,230	1,814	2,158
Other			
Histologic technicians:			
HT(ASCP)	2,362	3,075	3,556
Other			
Other technicians and assistants:			
CLA (ASCP)	1,080	3,282	4,338
Other			

[1] Excludes physicians, see table 87 for numbers of pathologists-M.D. and D.O.

[2] Persons with a master's or doctor's degree.

[3] Persons with a bachelor's degree or ASCP certified. Replies from a 1967 survey indicated that nearly 91 percent of the MT(ASCP)'s have the equivalent of 4 years of college (GIST, issue No. 36. April 1967).

[4] Persons without a college degree. Includes persons trained in the Armed Forces, in commercial schools, or on the job as well as cytotechnologists graduated from AMA-approved schools.

Sources: Public Health Service, Bureau of Health Professions Education and Manpower Training, Division of Allied Health Manpower for 1965 and 1967 estimates, and National Center for Health Statistics, Division of Health Resources Statistics for 1968 estimates of numbers of scientists, technologists, technicians and assistants.

Board of Registry of Medical Technologists of the American Society of Clinical Pathologists for counts of certified personnel, including laboratory assistants.

American Board of Clinical Chemistry for counts of diplomates and the National Registry in Clinical Chemistry for counts of accredited personnel.

National Registry of Microbiologists for counts of diplomates of the American Board of Microbiology.

Table 29. NUMBER OF REGISTERED MEDICAL TECHNOLOGISTS: SELECTED YEARS, 1950 THROUGH 1968

Year	Total MT(ASCP)'s [1]	Active MT(ASCP)'s [2]	Year	Total MT(ASCP)'s [1]	Active MT(ASCP)'s [2]
1968	51,226	38,400	1962	33,874	
1967	47,597	35,600	1961	31,721	
1966	44,250		1960	29,736	22,300
1965	41,063	30,800	1955	18,000	
1964	38,139		1950	14,000	
1963	35,584				

[1] For the years 1960–68 data show the number certified by the Registry as of June 30 of the following year.

[2] Estimated as three-fourths of the total. Replies from 30,000 of the 43,000 registrants in 1967 indicated that 73 percent worked in medical technology in 1966, full or part-time or occasionally (*GIST*, issue No. 36, April 1967).

Source: Board of Registry of Medical Technologists of the American Society of Clinical Pathologists.

Table 30. APPROVED PROGRAMS OF MEDICAL TECHNOLOGY, STUDENTS AND GRADUATES: SELECTED YEARS, 1949-50 THROUGH 1968-69

Academic year	Programs	Students [1]	Graduates	Academic year	Programs	Students [1]	Graduates
1968-69	787	5,055	3,710	1962-63	779	4,377	3,259
1967-68	787	5,285	3,855	1961-62	757	4,638	2,809
1966-67	786	5,119	3,845	1960-61	734	4,086	2,639
1965-66	773	4,752	3,460	1959-60	702	3,944	2,573
1964-65	781	4,161	3,065	1954-55	575	2,384	1,956
1963-64	784	4,291	2,689	1949-50	----	----	2,011

[1] Student enrollment is for the year of specialized training, and includes all students already enrolled and those admitted during the academic year. More than half of the schools have 2 or more classes per year.

Source: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.

Table 31. LOCATION OF APPROVED PROGRAMS OF MEDICAL TECHNOLOGY AND NUMBER OF STUDENTS AND GRADUATES: 1968-69

Location	Programs	Students	Graduates	Location	Programs	Students	Graduates
Total	[1] 692	5,055	[2] 3,710	Nebraska	8	98	66
				Nevada	3	6	4
Alabama	12	121	70	New Hampshire	2	14	12
Arkansas	9	48	27	New Jersey	25	157	103
Arizona	4	49	26	New Mexico	4	24	13
California	62	437	324	New York	32	256	197
Colorado	16	100	70	North Carolina	12	96	69
Connecticut	14	82	81	North Dakota	5	49	37
Delaware	1	11	11	Ohio	20	141	96
District of Columbia	9	62	47	Oklahoma	13	94	69
Florida	14	89	66	Oregon	5	74	61
Georgia	16	97	74	Pennsylvania	38	218	190
Hawaii	6	30	22	Rhode Island	1	7	7
Idaho	6	20	14	South Carolina	7	46	30
Illinois	44	275	228	South Dakota	6	42	22
Indiana	18	120	68	Tennessee	18	163	83
Iowa	14	89	64	Texas	38	321	244
Kansas	8	67	53	Utah	6	36	25
Kentucky	12	70	69	Vermont	1	15	20
Louisiana	18	152	112	Virginia	9	94	70
Maine	3	18	8	Washington	11	104	73
Maryland	4	28	10	West Virginia	6	54	45
Massachusetts	23	186	84	Wisconsin	32	216	181
Michigan	32	217	189	Wyoming	1	6	3
Minnesota	12	141	122				
Mississippi	6	23	16	Canal Zone	1	4	4
Missouri	19	129	79	Puerto Rico	1	33	35
Montana	4	16	17				

[1] An additional 95 schools did not submit reports on students or graduates.

[2] In 1968-69, 84 programs reported no graduates and 128 reported only one or two graduates during the year.

Source: Department of Allied Medical Professions and Services, American Medical Association.

Table 32. APPROVED PROGRAMS OF CYTOTECHNOLOGY, STUDENTS, AND GRADUATES: 1962-63 THROUGH 1968-69

Academic year	Programs	Students	Graduates	Academic year	Programs	Students	Graduates
1968–69	118	421	388	1964–65	84	340	332
1967–68	109	405	368	1963–64	79	330	291
1966–67	98	429	348	1962–63	77	352	292
1965–66	92	375	325				

Source: Council on Medical Education: Education number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues

Table 33. LOCATION OF APPROVED PROGRAMS OF CYTOTECHNOLOGY AND NUMBER OF STUDENTS AND GRADUATES: 1968-69

Location	Programs	Students	Graduates	Location	Programs	Students	Graduates
Total	[1] 98	421	[2] 388	Nebraska	1	3	3
				Nevada	—	—	—
Alabama	2	9	6	New Hampshire	—	—	—
Arizona	—	—	—	New Jersey	—	—	—
Arkansas	—	—	—	New Mexico	—	—	—
California	4	39	34	New York	5	27	24
Colorado	1	4	2	North Carolina	7	10	14
Connecticut	3	15	13	North Dakota	—	—	—
Delaware	—	—	—	Ohio	9	38	35
District of Columbia	1	—	4	Oklahoma	1	6	5
Florida	3	13	11	Oregon	1	8	8
Georgia	2	12	12	Pennsylvania	9	30	28
Hawaii	—	—	—	Rhode Island	2	9	9
Idaho	—	—	—	South Carolina	2	8	5
Illinois	3	31	34	South Dakota	—	—	—
Indiana	2	3	3	Tennessee	3	19	16
Iowa	3	8	6	Texas	8	20	18
Kansas	1	6	4	Utah	1	3	3
Kentucky	1	9	8	Vermont	—	—	—
Louisiana	1	6	5	Virginia	4	14	11
Maine	—	—	—	Washington	3	8	8
Maryland	2	10	13	West Virginia	1	6	6
Massachusetts	2	—	—	Wisconsin	2	12	12
Michigan	3	10	9	Wyoming	—	—	—
Minnesota	1	7	7				
Mississippi	1	3	3	Canal Zone	—	—	—
Missouri	2	4	4	Puerto Rico	1	5	5
Montana	—	—	—				

[1] An additional 20 schools did not submit reports on students or graduates.
[2] In 1968–69, 22 schools reported no graduates and 19 schools reported only one or two graduates during that year.

Source: Department of Allied Medical Professions and Services, American Medical Association.

Table 34. CERTIFIED LABORATORY ASSISTANT EDUCATIONAL PROGRAMS: TREND DATA, 1964-65 THROUGH 1968-69

Academic year	Programs	Capacity	Enrollment	Graduates
1968–69	187	1,852	935	830
1967–68				
1966–67	148	1,234	[1] 1,100	
1965–66	115			
1964–65	83		712	[2] 467

[1] Estimated.

[2] Students graduated January-September 1965. Additional students scheduled for graduation later in 1965.

Sources: Council on Medical Education: Education number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.
National Committee for Careers in Medical Technology—unpublished data provided by the Board of Certified Laboratory Assistants (ASCP-ASMT).

Table 35. LOCATION OF APPROVED PROGRAMS FOR CERTIFIED LABORATORY ASSISTANTS AND STUDENT CAPACITY: SPRING 1969

Location	Programs	Student capacity	Location	Programs	Student capacity
Totals	187	1,852	Nebraska	—	—
			Nevada	—	—
Alabama	4	53	New Hampshire	1	8
Arizona	—	—	New Jersey	8	47
Arkansas	2	14	New Mexico	2	29
California	—	—	New York	7	75
Colorado	—	—	North Carolina	4	44
Connecticut	6	63	North Dakota	—	—
Delaware	3	20	Ohio	13	80
District of Columbia	2	42	Oklahoma	1	8
Florida	8	87	Oregon	—	—
Georgia	6	62	Pennsylvania	26	235
Hawaii	—	—	Rhode Island	1	6
Idaho	—	—	South Carolina	4	52
Illinois	10	108	South Dakota	2	11
Indiana	9	115	Tennessee	5	80
Iowa	3	34	Texas	10	58
Kansas	1	15	Utah	—	—
Kentucky	6	43	Vermont	2	9
Louisiana	—	—	Virginia	9	73
Maine	1	4	Washington	1	12
Maryland	2	20	West Virginia	7	63
Massachusetts	5	140	Wisconsin	7	60
Michigan	3	17	Wyoming	—	—
Minnesota	3	48			
Mississippi	1	6	Canal Zone	—	—
Missouri	—	—	Puerto Rico	—	—
Montana	1	6	Japan	[1] 1	5

[1] USAF hospital school.

Source: Department of Allied Medical Professions and Services, American Medical Association.

CHAPTER 8

Dentistry and Allied Services*

Dentistry is that branch of the health professions responsible for maintaining and improving the health of the teeth and related structures. Early diagnosis and treatment of tooth decay, periodontal disease, malocclusion, and other oral disorders make possible proper mastication of food, and contribute toward normal speech and facial appearance. Prompt detection of oral cancer and other systemic conditions which manifest themselves in the mouth is necessary for the maintenance of general health.

Modern dentistry places great emphasis upon the prevention and control of dental disease, through such measures as the early detection and correction of diseases of the teeth and supporting structures, fluoridation, and dental health education. Educational programs stress the importance of proper diet, correct oral hygiene practices, and the importance of regular dental examinations. Dental research, both basic and applied, is another increasingly important component of professional activity.

The dental work force consists of dentists and three allied occupational groups—dental hygienists, dental assistants, and dental laboratory technicians. Since 1950, the number of allied dental personnel has increased more rapidly than the dentist supply; auxiliaries currently account for almost three-fifths of the total dental work force.

Training facilities for dentists and dental auxiliaries are being established on a continuing basis as a result of the increasing demand for dental services. The Council on Dental Education of the American Dental Association accredits dental and dental auxiliary training programs. All dental schools hold institutional membership in the American Association of Dental Schools.

Dentists

In mid-1968 there was a total of 113,636 dentists in the United States, excluding the 1968 graduates. Of approximately 100,000 active dentists, about 92,000 were non-Federal dentists located in the 50 States and the District of Columbia, and some 8,000 were Federal dentists in the Armed Forces, Public Health Service, and Veterans' Administration. In 1968, the American Dental Association, a nationwide professional organization for dentists, had 95,349 members.

The Nation's supply of dentists in relation to the civilian population declined sharply between 1950 and 1960 (table 36). Even though the dentist-to-population ratio improved slightly during the 1960's, the ratio still remains considerably below the 1950 level. In 1950, there were 50 active non-Federal dentists per 100,000 civilians, while in 1968 the ratio stood at 47 per 100,000.

The distribution of dentists by State varied widely in 1968, ranging from 68 active non-Federal dentists per 100,000 civilians in New York to 22 in South Carolina (table 37). In general, States in the Northeast and Far West had dentist-population ratios more favorable than the national average, while the South and Southwest had the least satisfactory supply of dentists.

Almost all dentists provide care to patients, primarily in private dental offices, but also in public and private clinics and hospitals, military installations, and other institutions. Diagnosis and treatment of existing oral diseases and abnormalities may involve filling decayed teeth, treatment of soft and hard tissues surrounding teeth, extraction of teeth, provision of artificial teeth and dentures, and straightening of teeth. Dentists may also provide preventive services including topical application of fluorides, scaling and polishing of teeth, and adjustment of occlusion.

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* This chapter was prepared by the Public Health Service, *Division of Dental Health, Resource Analysis Branch*—Dr. Stanley Lotzkar, Chief; Dr. Donald Johnson, Assistant Chief; and Mary Thompson, Statistician.

Some active dentists are primarily engaged in nonclinical activities, such as teaching, research, or administration of dental programs. These dentists are employed by dental schools, public health departments, dental societies, and various other public and private organizations. A number of dentists in private practice also devote a part of their professional time to teaching and research and to voluntary community services, such as examination of school children's teeth.

Although most dentists are general practitioners, the number of specialists has increased rapidly in recent years, showing a threefold increase from 1955 to 1968 (table 38). In 1968, 9,257 dentists were recognized by the American Dental Association as specialists in eight areas of dentistry. Over two-fifths, or some 4,000, of the specialists limited their practice exclusively to orthodontics (straightening of teeth). The next largest group, about 2,200, specialized in oral surgery, followed by approximately 1,000 in pedodontics (dentistry for children). Only one-fifth of the specialists engaged in one of the other five recognized areas—periodontics (treatment of gums and underlying bone), prosthodontics (providing artificial replacements for missing teeth), endodontics (root canal therapy), public health dentistry, and oral pathology.

In each State and the District of Columbia, a dentist (D.D.S. or D.M.D.) must be a graduate of an accredited dental school and must obtain a license before practicing dentistry. Dentists receive 4 years of professional education in a dental school, following 2 or more years of predental college training. In the academic year 1968–69, three-fifths of all freshmen dental students had earned a bachelor's degree prior to entering dental school, while another one-third had completed 3 years of predental college work. To qualify for licensure in a State, dental school graduates must pass both a written and a clinical examination. In 1968, 47 States accepted the written examination given by the National Board of Dental Examiners in lieu of the State's own written examination; however, each State still examines the clinical skills of the candidate.

Eleven new dental schools have been established since 1950 and several others have expanded their training facilities. As a result, the number of annual graduates had increased about 35 percent by 1968, even though the annual number of graduates remained fairly constant during the early 1960's (table 39). In 1968, a total of 3,457 dentists were graduated from the 52 dental schools in the United States and Puerto Rico (table 40). Undergraduate enrollment reached a new high of 15,408 in the 1968–69 academic year.

A comparatively small number of dentists have immigrated to the United States in recent years. In 1966, a total of 209 dentists entered the United States from some 40 foreign countries.

Dental Hygienists

Dental hygienists are the only dental auxiliaries who provide service directly to the patient, and who, like dentists, are required in each State to obtain a license to practice. The hygienist, working under the direction of a dentist, performs prophylaxes (scaling and polishing of the teeth), exposes and processes dental X-ray films, applies fluoride solution to children's teeth, instructs individual patients in toothbrushing techniques and proper diet as related to the teeth, and performs other duties in conformity with her training and licensing.

In 1967, an estimated 15,000 dental hygienists were in practice. Approximately 7,500 hygienists are members of the American Dental Hygienists' Association. Since 1950, the number of active hygienists has increased by about 8,000, but there are still only 16 active hygienists per 100 practicing dentists. Because part-time employment is common, the supply of hygienists is actually not as favorable as this ratio suggests.

The great majority of dental hygienists provide services to patients, working primarily in private dental offices, but also in public and parochial schools, public and private clinics, hospitals, and other institutions. Some hygienists, however, are engaged in other activities, such as determining dental treatment needs of school children, reporting these findings to parents, and giving dental health talks in classrooms.

Dental hygienists receive at least 2 years of education at the college level. The dental hygiene curriculum, which includes basic sciences, dental sciences, and liberal arts, is usually open to high school graduates. However, in 1968, one institution out of every five required some college training for admission to this program. Originally, dental hygiene programs were provided primarily by schools of dentistry, but increasing numbers of

junior colleges and technical schools are now offering this training.

Two types of college training are available to the hygiene student. The 2-year associate degree or certificate program qualifies a hygienist for clinical practice. The level of training required for leadership positions in teaching and public health is provided by the 4-year bachelor's degree program in dental hygiene. Hygienists completing the latter program qualify for graduate training leading to the master's degree in related fields.

The number of schools offering dental hygiene programs has increased substantially in recent years, from 37 in 1960 to 85 in 1968 (table 41). As a result, the number of students in training more than doubled during this period. Enrollment in academic year 1968–69 totaled 5,187 students, and 1,834 hygienists were graduated in 1968 (table 42). The bachelor's degree program was offered by 25 schools in 1968, including 15 schools which offered both the 2-year and 4-year programs. The remaining 60 schools offered only the associate degree or certificate in dental hygiene.

Dental Assistants

The dental assistant's primary function, that of assisting the dentist at the chairside, includes preparing the patient for treatment, keeping the operating field clear, mixing filling materials, and passing instruments. Other duties involve exposing and processing X-ray films, sterilizing instruments, assisting with laboratory work, ordering supplies, and handling the office records and accounts.

All dental schools now routinely train dental students in the effective utilization of chairside assistants. The utilization of assistants has progressively increased until today more than four of every five dentists in private practice employ at least one dental assistant. An estimated 95,000 persons were employed as dental assistants in 1967 as compared with only 55,200 in 1950. Dental assistants usually work full-time.

Traditionally, dental assistants have been trained on the job by their dentist-employers. However, the number of institutions offering accredited training programs for assistants has increased markedly from 26 in 1961 to 134 in 1968, a fivefold expansion within this 7-year period (table 43). To be accredited, a program must provide at least 1 academic year of training in dental assisting. However, 2-year programs are also available in which the required training in dental assisting is supplemented with another year of general education.

The 2-year training program leading to an associate degree or certificate was offered by 42 institutions in 1968, including eight that provided both the 2-year and the 1-year certificate programs. The remaining 92 schools offered only the 1-year program. In the academic year 1968–69, 4,475 students were in training (table 44). The number graduating reached 2,302 in 1968.

Experienced dental assistants who are graduates of either the 1-year or the 2-year accredited training program, or who have completed equivalent training, are eligible to be certified by the Certifying Board of the American Dental Assistants Association. Of some 14,500 members of the Association in 1968, approximately 6,000 were certified.

Dental Laboratory Technicians

Dental laboratory technicians are highly skilled craftsmen who perform many tasks involved in the construction of complete and partial dentures, fixed bridgework, crowns, and other such dental restorations and appliances. Dentists are relieved of many time-consuming procedures by utilizing the skills of technicians who perform such tasks as waxing, investing, casting, soldering, finishing, and polishing. Technicians do not have direct contact with patients, but perform their work in accordance with instructions received from the dentist.

Dental laboratory technicians may be employed in a dental office and work directly for a dentist. Most technicians, however, are employed in commercial dental laboratories which serve the majority of the Nation's dentists.

The number of technicians has increased from about 21,000 in 1950 to an estimated 27,000 in 1967. Approximately 21,500 technicians work in 6,700 commercial dental laboratories, and 5,500 technicians are employed by dentists in private practice. The Joint Commission on Accreditation of Dental Laboratories was established in 1963 to accredit commercial laboratories. In 1968, there were about 400 dental laboratories, representing 46 States and the District of Columbia, which were accredited by the Joint Commission.

Most dental laboratory technicians have received their training on the job in commercial laboratories or dental offices. Relatively few formal educational programs for technicians are available at the present time. In 1968, only 19 accredited institutions offered 2-year academic programs, and 13 of these schools were established within the last 3 years (table 45). During academic year 1968–69, 803 students were enrolled in these accredited programs, which provide one year of basic and dental sciences and a second year of supervised practical laboratory experience. The number graduating in 1968 was 325 (table 46).

There were approximately 6,300 certified dental laboratory technicians in 1968. Technicians who have completed the 2-year accredited curriculum and 3 years of employment experience, or who have fulfilled other requirements in lieu of the formal training, may be certified after passing an examination given by the National Board for Certification of the National Association of Certified Dental Laboratories.

Table 36. DENTISTS IN RELATION TO POPULATION: SELECTED YEARS, JULY 1, 1950 THROUGH 1968

Dentists and population	1950	1960	1968
Total dentists [1]	87,164	101,947	113,636
Total population (thousands) [2]	152,271	180,684	201,166
Dentists per 100,000 population	57.2	56.4	56.5
Active non-Federal dentists	75,313	82,630	92,013
Resident civilian population (thousands)	150,790	178,153	197,571
Active non-Federal dentists per 100,000 civilians	49.9	46.4	46.6

[1] Excludes graduates of years which are specified, but includes all other dentists, active or inactive.

[2] Includes all persons in the United States and in the Armed Forces overseas.

Sources: Bureau of Membership Records: *American Dental Directory*. Chicago. American Dental Association. Annual editions.

Bureau of Economic Research and Statistics: *Distribution of Dentists in the United States by State, Region, District and County*. Chicago. American Dental Association. Annual issues.

Division of Dental Health, Bureau of Health Professions Education and Manpower Training, National Institutes of Health for estimate of total dentists in 1968 and active dentists in 1950, 1960 and 1968.

U.S. Bureau of the Census: Population estimates. *Current Population Reports*, Series P-25, *No.* 413, January 1969.

Table 37. NUMBER OF NON-FEDERAL DENTISTS IN RELATION TO CIVILIAN POPULATION: JULY 1, 1968

Location	Civilian population in thousands [1]	Number of non-Federal dentists [2]		Dentists per 100,000 civilians	
		Total	Active	Total	Active
United States	197,571	105,636	92,013	53	47
Alabama	3,522	1,142	1,038	32	29
Alaska	241	95	90	39	37
Arizona	1,631	727	650	45	40
Arkansas	1,976	612	543	31	27
California	18,918	11,922	10,419	63	55
Colorado	1,986	1,197	1,052	60	53
Connecticut	2,951	1,892	1,685	64	57
Delaware	525	243	226	46	43
District of Columbia	790	829	724	105	92

See footnotes at end of table.

Table 37. NUMBER OF NON-FEDERAL DENTISTS IN RELATION TO CIVILIAN POPULATION: JULY 1, 1968—Continued

Location	Civilian population in thousands [1]	Number of non-Federal dentists [2]		Dentists per 100,000 civilians	
		Total	Active	Total	Active
Florida	6,048	3,174	2,745	52	45
Georgia	4,452	1,399	1,266	31	28
Hawaii	727	482	437	66	60
Idaho	699	329	299	47	43
Illinois	10,934	6,357	5,387	58	49
Indiana	5,051	2,298	2,007	45	40
Iowa	2,771	1,541	1,288	56	46
Kansas	2,262	993	841	44	37
Kentucky	3,160	1,173	1,041	37	33
Louisiana	3,678	1,368	1,227	37	33
Maine	963	425	348	44	36
Maryland	3,677	1,616	1,466	44	40
Massachusetts	5,431	3,855	3,314	71	61
Michigan	8,720	4,472	3,990	51	46
Minnesota	3,642	2,516	2,127	69	58
Mississippi	2,321	644	581	28	25
Missouri	4,583	2,300	1,903	50	42
Montana	686	366	318	53	46
Nebraska	1,424	948	793	67	56
Nevada	439	197	184	45	42
New Hampshire	699	327	291	47	42
New Jersey	7,020	4,297	3,783	61	54
New Mexico	990	344	315	35	32
New York	18,040	14,251	12,183	79	68
North Carolina	5,006	1,590	1,423	32	28
North Dakota	614	278	228	45	37
Ohio	10,564	5,136	4,463	49	42
Oklahoma	2,475	994	874	40	35
Oregon	2,003	1,547	1,373	77	69
Pennsylvania	11,709	6,577	5,621	56	48
Rhode Island	883	465	407	53	46
South Carolina	2,584	648	581	25	22
South Dakota	651	290	239	45	37
Tennessee	3,940	1,579	1,428	40	36
Texas	10,784	4,023	3,626	37	34
Utah	1,029	634	564	62	55
Vermont	424	194	166	46	39
Virginia	4,412	1,878	1,725	43	39
Washington	3,204	2,126	1,893	66	59
West Virginia	1,801	654	564	36	31
Wisconsin	4,218	2,534	2,142	60	51
Wyoming	311	153	135	49	43

[1] State figures do not add to total due to rounding.

[2] Estimated. Excludes graduates of the 1968 class.

Sources: Division of Dental Health, Bureau of Health Professions Education and Manpower Training, National Institutes of Health. U.S. Bureau of the Census: Population estimates. *Current Population Reports*. Series P-25, No. 414, January 1969.

Table 38. NUMBER OF DENTAL SPECIALISTS: SELECTED YEARS, 1955 THROUGH 1968

Specialist	1955	1960	1965	1968
All specialists	3,034	4,170	6,462	9,257
Endodontists [1]				413
Oral pathologists	24	42	52	61
Oral surgeons	844	1,183	1,636	2,198
Orthodontists	1,521	2,097	3,437	4,008
Pedodontists	148	229	568	1,037
Periodontists	245	307	376	868
Prosthodontists	225	278	336	597
Public health dentists	27	34	57	75

[1] Endodontics was not recognized as a dental specialty in 1955 or 1960 and data are unavailable for 1965.

Source: Bureau of Economic Research and Statistics: *Facts About States for the Dentist Seeking a Location.* Chicago. American Dental Association. Annual issues and unpublished 1968 data.

Table 39. DENTAL SCHOOLS, STUDENTS, AND GRADUATES: SELECTED YEARS, 1949-50 THROUGH 1968-69

Academic year	Schools	Students	Graduates	Academic year	Schools	Students	Graduates
1968–69	52	15,408	[1] 3,470	1962–63	48	13,576	3,233
1967–68	50	14,955	3,457	1961–62	47	13,513	3,207
1966–67	49	14,421	3,360	1960–61	47	13,580	3,290
1965–66	49	14,020	3,198	1959–60	47	13,581	3,253
1964–65	49	13,876	3,181	1954–55	43	12,601	3,081
1963–64	48	13,691	3,213	1949–50	41	11,460	2,565

[1] Estimated.

Source: Council on Dental Education: *Dental Students' Register.* Chicago. American Dental Association. Annual issues. Also *Annual Report on Dental Education,* 1967–68 and 1968–69.

Table 40. LOCATION AND OWNERSHIP OF DENTAL SCHOOLS AND NUMBER OF STUDENTS AND GRADUATES: 1968

State	School	Ownership	Students (1968–69)	Graduates (1968)
	Total, 52 schools		15,408	3,457
Ala.	University of Alabama School of Dentistry, Birmingham.	Public	207	42
Calif.	University of Pacific, College of Physicians & Surgeons, School of Dentistry, San Francisco.	Private	295	58
	Loma Linda University School of Dentistry, Loma Linda	do	231	57
	University of California School of Dentistry, San Francisco	Public	299	80
	University of California at Los Angeles School of Dentistry, Los Angeles.	do	294	27
	University of Southern California School of Dentistry, Los Angeles.	Private	426	105
Conn.	University of Connecticut School of Dental Medicine, Farmington.	Public	17	[1]
D.C.	Georgetown University School of Dentistry, Washington.	Private	398	92
	Howard University College of Dentistry, Washington	do	310	76

See footnotes at end of table.

Table 40. LOCATION AND OWNERSHIP OF DENTAL SCHOOLS AND NUMBER OF STUDENTS AND GRADUATES: 1968—Continued

State	School	Ownership	Students (1968-69)	Graduates (1968)
Ga	Emory University School of Dentistry, Atlanta	Private	318	67
Ill	Loyola University of Chicago School of Dentistry, Chicago	do	403	77
	Northwestern University Dental School, Chicago	do	322	71
	University of Illinois College of Dentistry, Chicago	Public	362	93
Ind	Indiana University School of Dentistry, Indianapolis	do	391	89
Iowa	University of Iowa College of Dentistry, Iowa City	do	227	50
Ky	University of Kentucky College of Dentistry, Lexington	do	185	43
	University of Louisville School of Dentistry, Louisville	Private	218	51
La	Louisiana State University School of Dentistry, New Orleans.	Public	30	[1]
	Loyola University School of Dentistry, New Orleans	Private	169	53
Md	University of Maryland School of Dentistry, Baltimore	Public	392	89
Mass	Harvard University School of Dental Medicine, Boston	Private	60	11
	Tufts University School of Dental Medicine, Boston	do	411	94
Mich	University of Detroit School of Dentistry, Detroit	do	321	58
	University of Michigan School of Dentistry, Ann Arbor	Public	375	81
Minn	University of Minnesota School of Dentistry, Minneapolis	do	419	94
Mo	St. Louis University School of Dentistry, St. Louis	Private	163	56
	University of Missouri at Kansas City School of Dentistry, Kansas City.	Public	470	113
	Washington University School of Dentistry, St. Louis	Private	204	42
Nebr	Creighton University School of Dentistry, Omaha	do	192	43
	University of Nebraska College of Dentistry, Lincoln	Public	200	32
N.J	Fairleigh Dickinson University School of Dentistry, Teaneck.	Private	207	43
	New Jersey College of Medicine and Dentistry, Jersey City	Public	181	42
N.Y	Columbia University School of Dental and Oral Surgery, New York.	Private	142	29
	New York University College of Dentistry, New York	do	678	150
	State University of New York at Buffalo School of Dentistry, Buffalo.	Public	279	64
N.C	University of North Carolina School of Dentistry, Chapel Hill.	do	207	45
Ohio	Case Western Reserve University School of Dentistry, Cleveland.	Private	255	53
	Ohio State University College of Dentistry, Columbus	Public	589	140
Oreg	University of Oregon Dental School, Portland	do	312	77
Pa	Temple University School of Dentistry, Philadelphia	Public	502	114
	University of Pennsylvania School of Dental Medicine, Philadelphia.	Private	554	115
	University of Pittsburgh School of Dentistry, Pittsburgh	Public	428	102
S.C	Medical College of South Carolina, Charleston	do	45	[2]
Tenn	Meharry Medical College School of Dentistry, Nashville	Private	136	28
	University of Tennessee College of Dentistry, Memphis	Public	397	113
Tex	Baylor University College of Dentistry, Dallas	Private	389	91
	University of Texas Dental Branch, Houston	Public	386	93
Va	Medical College of Virginia School of Dentistry, Richmond	do	302	68
Wash	University of Washington School of Dentistry, Seattle	do	300	69
W.Va	West Virginia University School of Dentistry, Morgantown.	do	208	46
Wis	Marquette University School of Dentistry, Milwaukee	Private	469	105
P.R	University of Puerto Rico School of Dentistry, San Juan	Public	133	26

[1] 1st graduating class in 1972.

[2] 1st graduating class in 1971.

Source: Council on Dental Education, *Annual Report on Dental Education, 1968–69*. Chicago. American Dental Association.

Table 41. SCHOOLS FOR TRAINING DENTAL HYGIENISTS, STUDENTS, AND GRADUATES: SELECTED YEARS, 1949-50 THROUGH 1968-69

Academic year	Schools	Students	Graduates	Academic year	Schools	Stude nts	Graduates
1968–69	85	5,187	[1] 2,150	1962–63	47	3,005	1,257
1967–68	67	4,309	1,834	1961–62	43	2,752	1,219
1966–67	58	4,041	1,739	1960–61	37	2,497	1,023
1965–66	56	3,863	1,650	1959–60	34	2,237	992
1964–65	53	3,502	1,491	1954–55	31	1,938	857
1963–64	49	3,278	1,429	1949–50	18	1,091	529

[1] Estimated.

Source: Council on Dental Education: *Dental Students' Register*. Chicago. American Dental Association. Annual issues. Also *Annual Report on Dental Auxiliary Education*, 1967–68 and 1968–69.

Table 42. LOCATION AND OWNERSHIP OF SCHOOLS FOR TRAINING DENTAL HYGIENISTS, AND NUMBER OF STUDENTS AND GRADUATES: 1968

State	School	Ownership	Students (1968–69)	Graduates (1968)
	Total, 85 schools [1]		5,187	1,834
Ariz	Phoenix College, Phoenix	Public	20	(2)
Ark	University of Arkansas, Little Rock	do	20	(2)
Calif	Cabrillo College, Aptos	do	52	(3)
	Chabot College, Hayward	do	17	(2)
	Diablo Valley College, Pleasant Hill	do	36	16
	Foothill College, Los Altos Hills	do	37	16
	Loma Linda University, Loma Linda**	Private	64	31
	University of California, San Francisco**	Public	49	21
	University of Southern California, Los Angeles**	Private	82	37
Colo	Rangely College of Mesa County Junior College, Rangely	Public	46	15
Conn	University of Bridgeport, Fones School of Dental Hygiene, Bridgeport*.	Private	124	48
D.C	Howard University, Washington	do	25	19
Fla	Palm Beach Junior College, Lake Worth	Public	72	35
	Pensacola Junior College, Pensacola	do	73	27
	St. Petersburg Junior College, St. Petersburg	do	58	20
Ga	Armstrong State College, Savannah	do	28	(2)
	Macon Junior College, Macon	do	17	(2)
	Medical College of Georgia, School of Allied Health Sciences, Augusta.**	do	21	(3)
Hawaii	University of Hawaii. Honolulu	do	49	14
Idaho	Idaho State University, Pocatello	do	39	12
Ill	Lake Land College, Matoon	do	31	(2)
	Loyola University, Chicago	Private	32	(2)
	Northwestern University, Chicago	do	61	20
	Parkland College, Champaign	Public	14	(2)
	Prairie State College, Chicago Heights	do	38	(3)
	Southern Illinois University, Vocational Technical Institute, Carbondale.	do	70	33
	William Rainey Harper College, Palatine	do	40	(2)
Ind	Indiana University, Indianapolis*	do	78	39
	Indiana University, Fort Wayne Regional Campus*	do	42	15
Iowa	State University of Iowa, Iowa City**	do	68	35
Kans	Wichita State University, Wichita	do	38	(3)
Ky	University of Louisville, Louisville*	Private	39	20
	University of Kentucky, School of Allied Health Professions, Lexington.**	Public	22	(3)

See footnotes at end of table.

Table 42. LOCATION AND OWNERSHIP OF SCHOOLS FOR TRAINING DENTAL HYGIENISTS, AND NUMBER OF STUDENTS AND GRADUATES: 1968—Continued

State	School	Ownership	Students (1968–69)	Graduates (1968)
La	Loyola University, New Orleans*	Private	78	29
Maine	Westbrook Junior College, Portland	do	66	23
Mass	Forsyth School for Dental Hygientists, Boston	do	210	96
Mich	Ferris State College, Big Rapids	Public	68	35
	Flint Community Junior College, Flint	do	40	(3)
	University of Detroit, Detroit*	Private	94	33
	University of Michigan, Ann Arbor*	Public	77	40
Minn	University of Minnesota, Minneapolis	do	110	39
Mo	Forrest Park Community College, St. Louis	do	48	(3)
	University of Missouri at Kansas City**	do	55	23
Nebr	University of Nebraska, Lincoln*	Public	34	10
N.J	Fairleigh Dickinson University, Teaneck*	Private	97	29
N.Mex	University of New Mexico, Albuquerque	Public	42	20
N.Y	Broome Technical Community College, Binghampton	do	84	30
	City University of New York, New York City Community College of Applied Arts and Sciences, Brooklyn.	do	172	52
	Columbia University, New York**	Private	40	21
	Erie County Technical Institute, Buffalo	Public	181	60
	Hudson Valley Community College, Troy	do	113	42
	Monroe Community College, Rochester	do	90	26
	Onondaga Community College, Syracuse	do	57	24
	State University of New York Agricultural and Technical Institute at Farmingdale, Long Island.	do	170	79
N.C	Central Piedmont Community College, Charlotte	do	71	33
	Guilford Technical Institute, Jamestown	do	17	27
	Wayne Technical Institute, Goldsboro	do	51	19
	University of North Carolina, Chapel Hill*	do	29	17
N.Dak	North Dakota State School of Science, Wahpeton	do	37	6
Ohio	Cuyahoga Community College, Cleveland	do	51	15
	Ohio State University, Columbus*	do	151	75
	University of Cincinnati, Cincinnati	do	46	(3)
Oreg	Lane Community College, Eugene	do	16	(2)
	University of Oregon Portland	do	63	27
Pa	Temple University, Philadelphia*	Public	122	45
	University of Pennsylvania, Philadelphia	Private	76	42
	University of Pittsburgh, Pittsburgh	Public	100	36
R.I	University of Rhode Island, Kingston	do	43	16
S.C	Greenville Technical Education Center, Greenville	do	22	(2)
	Richland Technical Education Center, Columbia	do	42	23
S.Dak	University of South Dakota, Vermillion	do	28	(3)
Tenn	Meharry Medical College, Nashville	Private	15	4
	University of Tennessee, Memphis	Public	98	47
Tex	Baylor University, Caruth School of Dental Hygiene, Dallas.*	Private	81	35
	University of Texas, Houston	Public	73	32
Vt	University of Vermont, Burlington	do	39	15
Va	Old Dominion College, Norfolk	do	67	(2)
Wash	Clark College, Vancouver	do	20	(2)
	Shoreline Community College, Seattle	do	24	(2)
	University of Washington, Seattle**	do	48	21
	Yakima Valley College, Yakima	do	12	(2)
W.Va	West Liberty State College, West Liberty*	do	99	35
	West Virginia University, Morgantown**	do	82	14
Wisc	Madison Area Technical College, Madison	do	23	(2)
	Marquette University, Milwaukee*	Private	113	66

[1] A total of 100 programs are offered in the 85 schools. Schools offering a 4-year program only are designated with a double asterisk (**); those schools providing both 4-year and 2-year programs are designated with a single asterisk (*). The remaining schools, with no special designation, offer a 2-year program only.

[2] 1st graduating class expected in 1970.

[3] 1st graduating class expected in 1969.

Source: Council on Dental Education. *Annual Report on Dental Auxiliary Education, 1968–69*. Chicago. American Dental Association. Also unpublished data.

Table 43. INSTITUTIONS OFFERING DENTAL ASSISTANT TRAINING PROGRAMS, STUDENTS, AND GRADUATES: 1961-62 THROUGH 1968-69

Academic year [1]	Institutions	Students	Graduates	Academic year [1]	Institutions	Students	Graduates
1968-69	134	4,475	[2] 2,700	1964-65	50	1,919	1,241
1967-68	101	3,819	2,302	1963-64	44	1,551	895
1966-67	81	3,159	1,965	1962-63	35	1,419	718
1965-66	64	2,798	1,593	1961-62	26	1,181	658

[1] Data available only since 1961-62. [2] Estimated.

Source: Council on Dental Education: *Dental Students' Register*. Chicago. American Dental Association. Annual issues. Also *Annual Report on Dental Auxiliary Education*, 1967-68 and 1968-69.

Table 44. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING DENTAL ASSISTANT TRAINING PROGRAMS AND NUMBER OF STUDENTS AND GRADUATES: 1968

State	Institution	Ownership	Students (1968-69)	Graduates (1968)
	Total, 134 institutions [1]		4,475	2,302
Ala.	Adult Education Center, Birmingham	Public	30	(2)
Ariz.	Maricopa Technical College, Phoenix	do	25	18
Ark.	Little Rock Adult Vocational School, Little Rock	do	20	10
Calif.	Cabrillo College, Aptos**	do	39	9
	Cerritos College, Norwalk*	do	82	41
	Chabot College, Hayward**	do	55	16
	Chaffey College, Alta Loma	do	33	35
	Citrus College, Azusa**	do	58	23
	City College of San Francisco, San Francisco**	do	84	15
	Contra Costa College, San Pablo*	do	30	11
	Diablo Valley College, Pleasant Hill**	do	43	13
	Foothill College, Los Altos Hills**	do	41	13
	Fullerton Junior College, Fullerton**	do	115	38
	Grossmont College, El Cajon**	do	74	21
	Allan Hancock College, Santa Maria**	do	38	(2)
	Laney College, Oakland*	do	61	16
	Loma Linda University School of Dentistry, Loma Linda	Private	3	(2)
	Long Beach City College, Long Beach*	Public	26	19
	Los Angeles City College, Los Angeles*	do	87	40
	College of Marin, Kentfield**	Private	38	17
	Modesto Junior College, Modesto**	Public	45	7
	Monterey Peninsula College, Monterey*	do	30	25
	Orange Coast College, Costa Mesa**	Private	80	24
	Pasadena City College, Pasadena**	Public	80	22
	Reedley College, Reedley**	do	70	21
	Rio Hondo Junior College, Whittier**	do	64	13
	Sacramento City College, Sacramento**	do	79	30
	San Diego Mesa College, San Diego*	do	99	37
	San Jose City College, San Jose**	do	58	18
	College of San Mateo, San Mateo**	Private	84	34
	Santa Rosa Junior College, Santa Rosa**	Public	51	8
Colo.	Emily Griffith Opportunity School, Denver*	do	25	17
Conn.	Eli Whitney Regional Vocational-Technical School, Hamden.	do	29	21
	J. M. Wright Technical School, Stamford	do	16	16

See footnotes at end of table.

Table 44. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING DENTAL ASSISTANT TRAINING PROGRAMS AND NUMBER OF STUDENTS AND GRADUATES: 1968—Continued

State	Institution	Ownership	Students (1968-69)	Graduates (1968)
Fla	Lindsey Hopkins Educational Center, Miami	Public	33	22
	Manatee Area Vocational-Technical Center, Bradenton	do	17	11
	Palm Beach Junior College, Lake Worth	do	35	23
	Pensacola Junior College, Pensacola	do	21	17
	Tomlinson Adult Education Center, St. Petersburg	do	27	24
Ga	Atlanta Area Technical School, Atlanta	do	28	18
Hawaii	Kapiolani Community College, Honolulu	do	13	8
Idaho	Boise Junior College, Boise	Public	21	16
Ill	Chicago City College, Loop Campus, Chicago**	do	49	(2)
	Lake Land College, Mattoon	do	6	18
	Loyola University School of Dentistry, Chicago	Private	23	6
	Morton Junior College, Cicero**	Public	16	4
	Parkland College, Champaign	do	22	13
	Prairie State College, Chicago Heights	do	25	13
	Rock Valley College, Rockford	do	23	20
	Triton College, River Grove	do	7	(2)
	University of Illinois College of Dentistry, Chicago	Private	24	26
Ind	Indiana University—Fort Wayne Regional Campus, Ft. Wayne.	Public	29	28
Iowa	Area VI Community College, Marshalltown	do	14	12
	Area X Community College, Cedar Rapids	do	31	(2)
	Area XI Community College, West Des Moines	do	24	17
	Iowa Western Community College, Council Bluffs	do	11	(2)
Kans	Flint Hills Area Vocational-Technical School, Emporia	do	19	12
	Haskell Institute—PHS Health Center, Lawrence	do	11	9
Ky	Jefferson Area Vocational School, Louisville	do	30	30
Md	Montgomery Junior College, Takoma Park**	do	28	14
Mass	Beth Israel Hospital, Boston	Private	20	11
	Boston University, Boston	Public	28	22
	Fanning Trade High School, Worcester	do	29	20
	McCann Vocational-Technical School, North Adams	do	12	6
	Northeastern University, Boston	Private	122	128
	Springfield Technical Institute, Springfield	Public	41	29
Mich	University of Detroit, Detroit	Private	25	16
	Ferris State College, Big Rapids**	Public	139	34
	Flint Community Junior College, Flint	do	12	6
	Grand Rapids Junior College, Grand Rapids**	do	31	6
	Michigan Lutheran College, Detroit	Private	18	3
	Northwestern Michigan College, Traverse City**	Public	22	3
	Oakland Community College, Union Lake	do	39	5
	Washtenaw Community College, Ann Arbor**	do	22	(2)
Minn	Brainerd Area Vocational-Technical School, Brainerd	do	28	16
	Hibbing Area Technical Institute, Hibbing	do	14	12
	University of Minnesota, Minneapolis	do	35	37
Miss	Itowamba Junior College, Tupelo	do	16	10
Mo	Forest Park Community Park, St. Louis	do	23	18
	Meramec Community College, Kirkwood	do	25	20
	Metropolitan Junior College, Kansas City**	do	43	10
	Springfield Vocational-Technical School	do	11	8
Mont	Great Falls Public Schools, Great Falls	do	29	16
Nebr	Central Nebraska Technical School of Dental Assisting, Hastings.**	do	20	7
	Lincoln Community College, Lincoln	do	25	25
	Omaha Public School of Dental Assisting, Omaha	do	20	18

See footnotes at end of table.

Table 44. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING DENTAL ASSISTANT TRAINING PROGRAMS AND NUMBER OF STUDENTS AND GRADUATES: 1968—Continued

State	Institution	Ownership	Students (1968–69)	Graduates (1968)
N.J	Essex County Adult Technical School, Newark	Public	37	40
	Union County Technical Institute, Scotch Plains	do	22	16
N.Mex	The University of New Mexico, Albuquerque	do	19	10
	Eastern New Mexico University, Roswell	do	8	(2)
N.Y	Dutchess Community College, Poughkeepsie**	do	22	5
	Hudson Valley Community College, Troy	do	21	17
	New York University, New York	do	32	30
	State University of New York, Buffalo	do	36	25
N.C	Central Piedmont Community College, Charlotte	do	27	20
	Guilford Technical Institute, Jamestown	do	12	15
	Technical Institute of Alamance, Burlington	do	18	13
	University of North Carolina, Chapel Hill	do	24	20
	Wayne Community College, Goldsboro	do	13	7
Ohio	Jane Addams Vocational High School, Cleveland	do	22	22
Oreg	Blue Mountain Community College, Pendleton	do	19	9
	Lane Community College, Eugene	do	20	17
	Oregon Technical Institute, Klamath Falls**	do	26	12
	Portland Community College, Portland	do	50	38
	Salem Technical-Vocational Community College	do	23	20
	Treasure Valley Community College, Ontario	do	6	3
Pa	Central Montgomery County Technical School, Norristown.	do	17	17
	Murrell Dobbins Technical School, Philadelphia	do	41	38
	University of Pittsburgh School of Dental Medicine, Pittsburgh.	do	54	51
S.C	Florence-Darlington Technical Education Center, Florence	do	21	17
	Greenville Technical Education Center, Greenville	do	18	20
	South Carolina Trade Schools, West Columbia	do	16	8
S.Dak	Lake Area Vocational-Technical School, Watertown	do	19	16
Tenn	Chattanooga Center for Continuing Education, Chattanooga.	do	20	13
Tex	Bee County College, Beeville**	do	11	(2)
	Del Mar College, Corpus Christi**	do	26	(2)
	El Centro College, Dallas**	do	30	(2)
	James Connally Technical Institute, Waco	do	15	9
	San Antonio College, San Antonio**	do	54	4
Utah	Intermountain School, PHS Health Center, Brigham City	do	10	8
	Utah Technical College at Provo	do	50	27
Va	Old Dominion College, Norfolk	do	23	(2)
Wash	Bellingham Technical School, Bellingham	do	20	15
	Olympia Vocational-Technical Institute, Olympia	do	21	14
	Seattle Community College, Seattle	do	25	20
	Spokane Community College, Spokane	do	43	10
	Tacoma Vocational-Technical Institute, Tacoma	do	32	29
W.Va	West Virginia University, Parkersburg	do	26	(2)
Wisc	Kenosha Technical Institute, Kenosha	do	29	29
	Madison Area Technical College, Madison	do	43	29
	Milwaukee Technical College, Milwaukee	do	45	30
	Northeast Wisconsin Technical Institute, Green Bay	do	26	16
	Western Wisconsin Technical Institute, La Crosse	do	22	20
P.R	University of Puerto Rico, San Juan	do	33	28

[1] A total of 142 programs are offered in the 134 institutions. Institutions providing a 2-year program only are designated with a double asterisk (**); those schools offering both 2-year and 1-year programs are designated with a single asterisk (*). Other listed schools, with no special designation, offer only a 1-year program.

[2] 1st graduating class expected in 1969.

Source: Council on Dental Education: *Annual Report on Dental Auxiliary Education, 1968–69*. Chicago. American Dental Association. Also unpublished data.

Table 45. INSTITUTIONS OFFERING TRAINING PROGRAMS FOR DENTAL LABORATORY TECHNICIANS, STUDENTS, AND GRADUATES: 1959-60 THROUGH 1968-69

Academic year	Institutions	Students	Graduates	Academic year	Institutions	Students	Graduates
1968–69	19	803	[1] 375	1963–64	5	285	104
1967–68	15	729	325	1962–63	5	295	108
1966–67	10	510	162	1961–62	4	273	95
1965–66	6	342	142	1960–61	4	230	81
1964–65	5	343	119	1959–60	3	184	78

[1] Estimated.

Source: Council on Dental Education: *Dental Students' Register*. Chicago. American Dental Association. Annual issues. Also *Annual Report on Dental Auxiliary Education*, 1967–68 and 1968–69.

Table 46. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING TRAINING PROGRAMS FOR DENTAL LABORATORY TECHNICIANS, AND NUMBER OF STUDENTS AND GRADUATES: 1968

Location	Institution	Ownership	Students (1968–69)	Graduates (1968)
	Total, 19 institutions		803	325
Calif	Casa Loma College, Pacoima	Public	69	39
	City College of San Francisco, San Francisco	do	39	16
	Diablo Valley College, Pleasant Hill	do	33	11
	Los Angeles City College, Los Angeles	do	132	35
Fla	Lindsey Hopkins Education Center, Miami	do	42	15
	Palm Beach Junior College, Lake Worth	do	25	9
Ga	Atlanta Area Technical School, Atlanta	do	37	12
Ill	Southern Illinois University, Carbondale	do	54	20
Ky	University of Kentucky, Lexington	do	16	5
Mich	Ferris State College, Big Rapids	do	44	15
Nebr	Central Nebraska Vocational-Technical School, Hastings	do	12	[1]
N.Y	New York City Community College, Brooklyn	do	86	38
N.C	Durham Technical Institute, Durham	do	37	14
Oreg	Portland Community College, Portland	do	24	12
S.D	Lake Area Vocational-Technical School, Watertown	do	18	[1]
Tex	James Connally Technical Institute, Waco	do	65	11
	Sheppard Air Force Base, Wichita Falls	Military	14	66
Wash	Tacoma Vocational-Technical Institute, Tacoma	Public	20	[1]
Wis	Milwaukee Technical College, Milwaukee	do	26	7

[1] 1st graduating class expected in 1970.

Source: Council on Dental Education: *Annual Report on Dental Auxiliary Education, 1968–69*. Chicago. American Dental Association. Also unpublished data.

CHAPTER 9

Dietetic and Nutritional Services

Both dietitians and nutritionists work in the field of nutrition, i.e., the art and science of food and its effect on the body. Dietitians generally work in an institutional setting such as a hospital or clinic, where they are responsible for food service to groups or individuals. Nutritionists work either in nutrition research or in promoting the application of nutrition research findings in the lives of people.

Together, the number of dietitians and nutritionists employed in 1968 was probably in excess of 30,000—the same as that estimated for 1965 and 1967. The decennial censuses had reported 22,000 persons so employed in 1950 and 26,000 in 1960 (table 47). The great majority of these persons are dietitians; about 1,000 are nutritionists. The type of employment and location of the members of The American Dietetic Association are shown in tables 48 and 49.

While no formal educational programs are available, the college major is generally home economics, with special emphasis on foods and nutrition and/or institution management. This education can be obtained in the home economics departments of about 400 colleges and universities. In 1966–67, 6,335 persons were awarded baccalaureates in home economics, 733 of which were for majors in foods and nutrition and 243 in institution management or administration. There were 39 bachelor's degrees in nutrition from colleges and universities with departments of nutrition and/or biochemistry (tables 50 and 51).

Dietitians

Dietitians are specialists educated for a profession responsible for the nutritional care of individuals and groups. Their work includes applying principles of nutrition and management in planning and directing food service programs in hospitals and related medical care facilities, schools, and other public and private institutions. In addition, they provide guidance and instruction to individuals and groups in applying principles of nutrition to eating habits and the selection of foods.

Close to 13,000 of the employed dietitians work in hospitals and related institutions, although increasing numbers are finding employment in educational institutions, and health agencies, industrial plants, and commercial eating places. The American Dietetic Association (ADA), reporting on the 20,271 members in 1968, indicated that 7,263 were not working—generally, retired persons and homemakers not seeking work. Of the 13,008 employed ADA members, 64 percent were administrative and therapeutic dietitians in hospitals and clinics; 8 percent were in college and school food service; 13 percent were consultant, research or teaching dietitians, with consultant dietitians comprising half of this group; 5 percent were public health, research, or teaching nutritionists; and 10 percent were employed in miscellaneous activities, were full time graduate students, or did not report (table 48).

Four types of dietitians are recognized; the most numerous being *administrative dietitians* directly concerned with food service programs. The director of the department of dietetics in hospitals, schools and universities, industry, and commercial food services may have qualified dietitians to assist in operating these large services. *Therapeutic dietitians* employed by hospitals formulate modified diets prescribed by the physician and instruct patients and their families on how to meet their special food needs. The *consulting dietitian* advises on food service practices and facilities and on nutritional problems in group feeding for child care centers, hospitals, nursing homes, schools, and other establishments. The *teaching dietitian* conducts educational programs in dietetics, nutrition and food service management. Any of these specialists may engage in research pertaining to dietetics; for example, as part of a clinical research study involving the patient, physician, and other health workers in a medical center.

For qualification as a professional dietitian, The American Dietetic Association recommends the completion of an approved dietetic internship or 3 years of qualifying experience meeting established standards (*21*).

In 1968, 770 graduates of accredited colleges and universities in the United States, Puerto Rico, and other countries were enrolled in dietetic internship programs approved by the ADA (table 52). Of the 64 internship programs approved that year, 57 were for hospitals, two for colleges and universities, three for business and industry, and one each for food clinics and State institutions (table 53).

Some dietitians take graduate courses leading to a master's or doctor's degree. Statistics from the Office of Education show that 141 persons received advanced degrees in foods and nutrition, 24 in institution management or administration from departments of home economics, and 138 in nutrition from departments of nutrition or biochemistry in 1967 (tables 50 and 51).

Membership in The American Dietetic Association (ADA) serves as a high standard of qualification in the profession, in lieu of certification or a license. Effective June 1, 1969 the ADA initiated a program to register dietitians who are members of the Association. Before September 1, 1969 all members may be registered under a "grandfather clause" and retain their R.D. (Registered Dietitian) title if continuing educational requirements are met. After this date all new applicants who are members of the Association must also pass the national registration examination in addition to meeting the continuing education requirements.

Nutritionists

Nutritionists are specialists concerned with the science of nutrition in relation to health and disease. Their work may include planning and conducting programs concerned with food and nutrition, examining the processes through which food is utilized by the body, and analyzing food to determine its composition in terms of essential ingredients or nutrients.

Three kinds of nutritionists are identified. *Public health nutritionists* in the employ of public and private health agencies are concerned with the application of the science of nutrition to the prevention of ill health, dietary control of disease, promotion of growth and development, provision of comprehensive continuous health care and rehabilitation, and the over-all conservation of human resources (*22*). *Teaching nutritionists* are engaged in academic educational programs for dietitians and nutritionists, physicians, dentists, nurses and allied health professionals. They may also contribute to nutrition education in the academic training programs for elementary and secondary teachers. *Research nutritionists* are concerned with the interrelationship of nutrients in food and their effects on health. They may conduct research such as studies of dietary and/or nutritional status of individuals and population groups; studies of the nutritional needs of vulnerable groups in specific medical care programs; and analysis of the nutrition component of health programs.

Preparation for nutritionist positions usually requires academic training at both the undergraduate and graduate levels (tables 50 and 51). For qualification as a public health nutritionist, the American Public Health Association recommends an advanced degree in nutrition including or supplemented by courses in nutrition as applied to public health. In 1968, 15 schools offered graduate programs in public health nutrition, the majority of which were in schools of public health (tables 54 and 55).

Workers in the field of nutrition may belong to several professional societies, in addition to The American Dietetic Association. Nutritionists are largely found within four sections of the American Home Economics Association—Food and Nutrition Section, Institution Administration Section, Colleges and Universities Section and Health and Welfare Section. Many public health nutritionists and nutrition educators belong to the Food and Nutrition Section of the American Public Health Association.

Underlying and supporting all of those workers in the field of applied nutrition are the more than 1,150 research scientists which comprise the American Institute of Nutrition. Experimental nutrition and the contribution of new knowledge in the science of nutrition is the primary concern of the members of this society.

Other Food Service Staff

The food service staff in hospitals and other health-related institutions, colleges, and other

educational institutions, and restaurants and other commercial institutions may include *dietary technicians* sometimes referred to as the *dietary assistants*, *food service supervisors*, and *clerical workers* in addition to service workers. The *dietary technician*, who may be identified as the food service manager or technician assists the dietitian and functions as the middle management person between the dietitian and food service superior. As a new member of the public health nutrition team, he assists with nutrition services provided by health agencies. The *food service supervisor's* specific duties include supervision of employees and of food service areas—depending on the size of the dietary department of the institution and the way in which it is organized. There were approximately 6,000 to 7,000 food service managers employed in 1968. *Food service clerical workers*, with basic stenographic and clerical skills, assist the dietitian with the paperwork of the dietary department. *Food service workers* have a wide range of jobs in food storage, preparing, cooking and serving food and in kitchen sanitation.

Courses are offered by schools to prepare high school students and adults for nutrition and food service employment. As a part of these courses students spend a number of hours in on-the-job training. Post high school programs to prepare dietary technicians and food service supervisors are offered by a number of vocational schools, technical institutes, and community colleges. In addition, these schools as well as health departments, higher institutions of learning, and hospitals offer continuing education opportunities to bring persons currently employed in nutrition and food service up to date.

A correspondence course conducted by The American Dietetic Association has trained 1,204 food service supervisors since 1960; as many as 563 students were enrolled in 1968.

REFERENCES

(21) American Dietetic Association: Goals of the Lifetime Education of the Dietitian, *J.A.D.A.* 54(2), Feb. 1969.

(22) Definition based on preliminary draft of report: *Public Health Nutritionists—Their Responsibility and Qualifications.*

Table 47. LOCATION OF DIETITIANS AND NUTRITIONISTS IN RELATION TO POPULATION: APRIL 1, 1960

Location	Number employed [1]	Rate per 100,000 population	Location	Number employed	Rate per 100,000 population
United States	26,119	15	Missouri	539	13
			Montana	62	9
Alabama	505	16	Nebraska	162	12
Alaska	19	8	Nevada	38	13
Arizona	89	7	New Hampshire	93	15
Arkansas	251	14	New Jersey	708	12
California	1,761	11	New Mexico	117	12
Colorado	330	19	New York	3,461	21
Connecticut	485	19	North Carolina	935	21
Delaware	74	17	North Dakota	66	10
District of Columbia	237	31	Ohio	1,379	14
Florida	703	14	Oklahoma	252	11
Georgia	799	20	Oregon	171	10
Hawaii	66	10	Pennsylvania	1,597	14
Idaho	71	11	Rhode Island	162	19
Illinois	1,446	14	South Carolina	399	17
Indiana	451	10	South Dakota	56	8
Iowa	265	10	Tennessee	607	17
Kansas	405	19	Texas	1,216	13
Kentucky	342	11	Utah	56	6
Louisiana	459	14	Vermont	46	12
Maine	103	11	Virginia	658	17
Maryland	448	14	Washington	427	15
Massachusetts	1,149	22	West Virginia	173	9
Michigan	1,020	13	Wisconsin	469	12
Minnesota	434	13	Wyoming	32	10
Mississippi	326	15			

[1] As reported in the 1960 Census of Population.

Source: Prindle, R. A., and Pennell, M. Y.: Industry and occupation data from the 1960 census, by State. *Health Manpower Source Book 17*, PHS Pub. No. 263, Section 17. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1963.

Table 48. TYPE OF EMPLOYMENT OF MEMBERS OF THE AMERICAN DIETETIC ASSOCIATION: SELECTED YEARS, 1965 THROUGH 1968

Item	1965		1967		1968	
	Number	Percent	Number	Percent	Number	Percent
Total membership	18,401		19,660		20,271	
Employment status:						
Not employed [1]	6,035		7,165		7,263	
Employed	12,366	100	12,495	100	13,008	100
Dietitians:						
Hospitals and clinics	7,541	61	8,047	64	8,225	64
College and school food service	930	8	1,022	8	1,030	8
Consultant, research, and teaching	1,605	13	1,526	12	1,671	13
Full-time graduate students [2]	160	1	165	1	181	1
Miscellaneous activities [3]	1,108	9	824	7	1,087	8
Nutritionists	698	6	695	6	711	5
No report	324	2	216	2	103	1

[1] Includes homemakers and retired members.
[2] On stipend.
[3] Includes restaurant and commercial business.

Source: American Dietetic Association.

Table 49. LOCATION OF MEMBERS OF THE AMERICAN DIETETIC ASSOCIATION BY TYPE OF EMPLOYMENT: NOVEMBER 1968

Location	Total employed ADA members	Dietitians			Nutritionists
		Hospitals and clinics	College and school food service	Consultant, research, and teaching	
All locations	[1] 13,008	8,225	1,030	1,671	711
United States	12,517	7,938	1,017	1,594	685
Alabama	164	104	9	32	5
Alaska	27	15	4	0	4
Arizona	109	71	6	12	14
Arkansas	64	36	4	13	5
California	1,441	928	112	189	63
Colorado	256	172	21	29	12
Connecticut	237	148	35	28	9
Delaware	43	20	10	3	3
District of Columbia	149	73	6	26	22
Florida	339	154	40	43	27
Georgia	165	107	15	17	13
Hawaii	72	44	4	8	5
Idaho	50	24	6	14	2
Illinois	788	501	44	80	42
Indiana	288	169	35	44	10
Iowa	214	134	22	42	5

See footnotes at end of table.

Table 49. LOCATION OF MEMBERS OF THE AMERICAN DIETETIC ASSOCIATION BY TYPE OF EMPLOYMENT: NOVEMBER 1968—Continued

Location	Total employed ADA members	Dietitians			Nutritionists
		Hospitals and clinics	College and school food service	Consultant, research, and teaching	
Kansas	190	125	17	29	4
Kentucky	152	92	16	22	11
Louisiana	201	113	39	30	11
Maine	34	17	3	12	4
Maryland	300	193	21	38	27
Massachusetts	456	291	29	50	27
Michigan	496	339	30	56	21
Minnesota	342	245	10	46	13
Mississippi	89	57	5	21	4
Missouri	287	232	8	24	17
Montana	53	24	3	7	5
Nebraska	130	87	8	22	4
Nevada	20	14	—	3	1
New Hampshire	42	30	3	6	2
New Jersey	325	194	25	37	24
New Mexico	58	32	3	9	5
New York	981	587	67	118	83
North Carolina	191	106	22	19	12
North Dakota	44	33	3	11	1
Ohio	712	483	55	77	23
Oklahoma	160	97	23	23	8
Oregon	157	96	16	23	6
Pennsylvania	662	451	60	62	21
Rhode Island	71	45	3	9	6
South Carolina	70	47	3	5	7
South Dakota	51	34	4	9	2
Tennessee	165	122	9	24	15
Texas	517	318	65	64	23
Utah	81	60	3	10	4
Vermont	40	25	3	7	2
Virginia	260	157	22	30	20
Washington	313	191	41	47	10
West Virginia	59	46	1	8	3
Wisconsin	361	244	24	44	17
Wyoming	21	11	—	7	1
Puerto Rico	90	58	2	10	9
Guam	—	—	—	—	—
Virgin Islands	5	2	—	—	3
Armed Forces overseas	77	59	—	7	2
Foreign areas [2]	319	168	11	60	12

[1] Includes 1,087 in miscellaneous activities, 103 who did not report, 216 retired, and 181 full-time graduate students. An additional 7,047 members were unemployed.

[2] Includes Canal Zone and Canada.

Source: The American Dietetic Association.

Table 50. EARNED DEGREES CONFERRED IN FOODS AND NUTRITION, INSTITUTION MANAGEMENT OR ADMINISTRATION, AND NUTRITION: 1960-61 THROUGH 1966-67

Academic year	Bachelor's degree	First professional [1]	Master's degree	Doctor's degree
Foods and nutrition (home economics)				
1966–67	733	—	121	20
1965–66	660	—	118	14
1964–65	645	—	115	16
1963–64	690	—	123	10
1962–63	620	—	105	13
1961–62	545	—	87	12
1960–61	534	—	118	7
Institution management or administration (home economics)				
1966–67	243	—	22	2
1965–66	251	—	24	—
1964–65	205	—	29	—
1963–64	158	—	14	—
1962–63	125	—	14	—
1961–62	148	—	18	—
1960–61	161	—	16	1
Nutrition (biological sciences)				
1966–67	39	—	104	34
1965–66	22	—	116	26
1964–65	33	29	62	21
1963–64	23	—	44	14
1962–63	5	—	34	5
1961–62	6	—	19	2
1960–61 [2]	—	—	—	—

[1] Not applicable to Foods and Nutrition nor to Institution Management or Administration.
[2] Data not reported separately.

Sources: National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1965–66*. OE–54018A-66. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Also prior annual issues. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands.

National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part A—Summary Data, 1966–67*. OE–54013–67. Office of Education, U. S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands.

Table 51. LOCATION OF SCHOOLS CONFERRING EARNED DEGREES IN FOODS AND NUTRITION, INSTITUTION MANAGEMENT AND ADMINISTRATION, AND NUTRITION, AND NUMBER OF GRADUATES BY LEVEL OF DEGREE: 1966-67

Location	School	Foods and nutrition			Institution management or administration			Nutrition		
		Bachelor's degree	Master's degree	Doctor's degree	Bachelor's degree	Master's degree	Doctor's degree	Bachelor's degree	Master's degree	Doctor's degree
	Total, all schools	733	121	20	243	22	2	39	104	34
	Selected schools	272	121	20	243	22	2	39	104	34
Ala.	Auburn University, Auburn	—	—	—	1	—	—	—	—	—
	Tuskegee Institute, Tuskegee	—	2	—	30	—	—	—	—	—
	University of Alabama, University	10	3	—	—	—	—	—	—	—
Ariz.	University of Arizona, Tucson	—	—	—	—	—	—	1	—	—
Ark.	University of Arkansas, Fayetteville	—	2	—	—	—	—	—	—	—
Calif.	Loma Linda University, Loma Linda	—	—	—	—	—	—	—	5	—
	University of California, Berkeley	—	—	—	—	—	—	13	7	4
	University of California, Los Angeles	—	—	—	—	—	—	—	1	—
	University of California, San Francisco	—	—	—	—	—	—	—	1	1
Colo.	Colorado State University, Fort Collins	15	6	1	—	—	—	—	—	—
Conn.	University of Connecticut, Storrs	14	2	—	—	—	—	—	1	1
D.C.	Howard University, Washington	—	—	—	2	—	—	—	—	—
Fla.	Florida State University, Tallahassee	14	1	2	—	—	—	—	—	—
Ga.	Berry College, Mount Berry	—	—	—	1	—	—	—	—	—
	Georgia College, Milledgeville	—	—	—	1	—	—	—	—	—
	Savannah State College, Savannah	—	—	—	1	—	—	—	—	—
Hawaii	University of Hawaii, Honolulu	—	—	—	6	—	—	—	3	—
Idaho	University of Idaho, Moscow	—	—	—	—	—	—	1	—	—
Ind.	Indiana University, Bloomington	—	2	—	—	—	—	—	—	—
	Purdue University, Lafayette	10	3	—	13	1	—	—	—	—
Iowa	Iowa State University of Science and Technology, Ames.	44	4	1	15	4	1	—	3	—
Kans.	Kansas State University of Agriculture and Applied Science, Manhattan.	6	7	2	9	7	—	—	—	—
	St. Benedict's College, Atchison	—	—	—	—	—	—	1	—	—
	University of Kansas, Lawrence	—	—	—	—	—	—	—	3	—
Ky.	University of Kentucky, Lexington	5	1	—	—	1	—	—	—	—
La.	Grambling College, Grambling	—	—	—	5	—	—	—	—	—
	Louisiana Polytechnic Institute, Ruston	—	—	—	5	—	—	—	—	—
	Louisiana State University, Baton Rouge.	—	—	—	4	—	—	—	—	—
	Northwestern State College, Natchitoches.	—	—	—	2	—	—	—	—	—
	University of Southwestern, Lafayette	—	—	—	2	—	—	—	—	—
Md.	University of Maryland, College Park	6	1	—	4	—	—	—	2	1
Mass.	Massachusetts Institute of Technology, Cambridge.	—	—	—	—	—	—	—	14	10
	Simons College, Boston	—	—	—	6	—	—	—	—	—
Mich.	Michigan State University, East Lansing.	21	3	1	—	4	—	—	—	—
Minn.	University of Minnesota, Minneapolis	—	—	—	—	—	—	1	2	1
Miss.	Mississippi State College for Women, Columbus.	—	—	—	—	—	—	3	—	—
	University of Southern Mississippi, Hattiesburg.	—	—	—	2	3	—	—	—	—
Mo.	Fontbonne College, St. Louis	—	—	—	—	—	—	8	—	—
	St. Louis University, St. Louis	—	2	—	—	—	—	—	—	—

See footnotes at end of table.

Table 51. LOCATION OF SCHOOLS CONFERRING EARNED DEGREES IN FOODS AND NUTRITION, INSTITUTION MANAGEMENT AND ADMINISTRATION, AND NUTRITION, AND NUMBER OF GRADUATES BY LEVEL OF DEGREE: 1966-67—Continued

Location	School	Foods and nutrition			Institution management or administration			Nutrition		
		Bachelor's degree	Master's degree	Doctor's degree	Bachelor's degree	Master's degree	Doctor's degree	Bachelor's degree	Master's degree	Doctor's degree
Mont.	Montana State University, Bozeman	—	3	—	2	—	—	—	—	—
Nebr.	University of Nebraska, Lincoln	—	—	—	—	—	—	—	—	5
Nev.	University of Nevada, Reno	—	—	—	7	—	—	—	—	—
N.J.	Rutgers, The State University, New Brunswick.	1	—	2	—	—	—	—	—	—
N.Y.	CUNY Hunter College, New York	—	1	—	—	—	—	—	—	—
	Columbia University, New York	—	—	—	—	—	—	—	17	2
	Cornell University, Ithaca	—	5	—	—	—	—	—	14	1
	New York University, New York	3	11	—	—	—	—	—	—	—
	Pratt Institute, Brooklyn	—	—	—	23	—	—	—	—	—
	Rochester Institute of Technology, Rochester.	—	—	—	22	—	—	—	—	—
	Syracuse University, Syracuse	11	2	—	—	—	—	—	—	—
N.C.	Agriculture and Technical College, Greensboro.	—	—	—	3	—	—	—	—	—
	Shaw University, Raleigh	—	—	—	1	—	—	—	—	—
	University of North Carolina, Chapel Hill.	—	—	—	—	—	—	—	2	—
	University of North Carolina at Greensboro, Greensboro.	3	1	—	3	—	—	—	—	—
N.Dak.	North Dakota State University, Fargo	13	1	—	—	—	—	—	—	—
Ohio	Case Western Reserve University, Cleveland.	—	4	—	—	—	—	5	16	—
	Ohio State University, Columbus	—	—	—	—	—	—	2	—	—
	Ohio University, Athens	8	1	—	—	—	—	—	—	—
Okla.	Oklahoma State University, Stillwater	10	8	1	—	—	—	—	—	—
Oreg.	Oregon State University, Corvallis	3	1	—	8	—	—	—	—	—
Pa.	Drexel Institute of Technology, Philadelphia.	13	12	—	3	—	—	—	—	—
	Pennsylvania State University, University Park.	1	7	—	38	1	—	—	—	—
	University of Pittsburgh, Pittsburgh	—	—	—	—	—	—	—	1	—
Tenn.	Southern Missionary College, Collegedale.	—	—	—	—	—	—	1	—	—
	University of Tennessee, Knoxville	15	3	—	2	—	—	3	4	1
Texas	Texas A. & M. University, College Station.	—	—	—	—	—	—	—	1	4
	Texas Technological College, Lubbock	11	1	—	—	—	—	—	—	—
	Texas Woman's University, Denton	3	2	—	—	—	—	—	4	3
Utah	Brigham Young University, Provo	11	1	—	—	—	—	—	—	—
	Utah State University, Logan	3	3	—	—	—	—	—	3	—
Va.	Hampton Institute, Hampton	—	—	—	2	—	—	—	—	—
	Madison College, Harrisonburg	—	—	—	3	—	—	—	—	—
	Virginia Polytechnic nstitute, Blacksburg.	3	2	6	—	—	—	—	—	—
	Virginia State College, Petersburg	—	—	—	3	—	—	—	—	—
Wash.	University of Washington, Seattle	—	—	—	8	—	—	—	—	—
Wis.	University of Wisconsin, Madison	15	13	4	6	1	1	—	—	—

Source: National Center for Educational Statistics: *Higher Education, Earned Degrees Conferred: Part B—Institutional Data, 1966–67.* OE–54013–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968.

Table 52. DIETETIC INTERNSHIP PROGRAMS AND INTERNS: SELECTED YEARS, 1951 THROUGH 1968

Year	Programs	Total interns	Interns with bachelor's degrees from		Year	Programs	Total interns	Interns with bachelor's degrees from	
			U.S. schools [1]	Other schools				U.S. schools [1]	Other schools
1968	[2] 65	770	749	21	1962	61	645	580	65
1967	[2] 64	734	706	28	1961	63	617	559	58
1966	[2] 64	696	666	30	1960	65	569	510	59
1965	[2] 63	672	[3] 633	39	1955	69	674	632	42
1964	63	670	636	34	1951	65	687	670	17
1963	62	651	592	59					

[1] Accredited colleges and universities in the United States and Puerto Rico.

[2] Includes Ohio State University program in medical dietetics for undergraduate students.

[3] Revised.

Sources: Programs—American Hospital Association: *Hospitals*, Guide Issue, Part 2. J.A.H.A. 42(15): 411, August 1968. Also prior annual issues.

Interns— American Dietetic Association.

Data for United States and Puerto Rico.

Table 53. LOCATION AND OWNERSHIP OF APPROVED DIETETIC INTERNSHIP PROGRAMS AND NUMBER OF INTERNS: 1968

Location	Program	Ownership	Interns
	Total, 64 programs		[1] 770
	Nutrition clinic internship		
Mass.	Frances Stern Nutrition Clinic-Tufts-New England Medical Center, Boston.	Private	6
	Hospital internships		
Ala.	Tuskegee Institute, Tuskegee	Public	9
	University of Alabama Hospitals and Clinics, Birmingham	do	10
Calif.	Highland General Hospital, Oakland	do	11
	Letterman General Hospital, San Francisco	do	12
	Loma Linda University, Department of Nutrition, Loma Linda	Private	14
	University of California, School of Public Health, Berkeley	Public	11
	University of California Hospitals, San Francisco	do	14
	Veterans' Administration Center, Los Angeles	do	21
Colo.	Colorado State Hospital, Pueblo	do	6
	Fitzsimons General Hospital, Denver	do	12
Conn.	Yale-New Haven Hospital, New Haven	Private	14
D.C.	Freedmen's Hospital, Washington	Public	10
	Walter Reed General Hospital, Washington	do	20
Ga.	Woodruff Medical Center of Emory U., Atlanta	Private	12
Ill.	Cook County Hospital, Chicago	Public	12
	University of Chicago Hospitals and Clinics, Chicago	Private	9
	Veterans' Administration Hospital, Hines	Public	20
Ind.	Indiana University Medical Center, Indianapolis	do	16
Iowa	University of Iowa Hospitals, Iowa City	do	12
Kans.	University of Kansas Medical Center, Kansas City	do	7
Mass.	Beth Israel Hospital, Boston	Private	14
	Massachusetts General Hospital, Boston	do	25
	Peter Brent Brigham Hospital, Boston	do	14

See footnotes at end of table.

Table 53. LOCATION AND OWNERSHIP OF APPROVED DIETETIC INTERNSHIP PROGRAMS AND NUMBER OF INTERNS: 1968—Continued

Location	Program	Ownership	Interns
Mich.	Harper Hospital, Detroit	Private	18
	Henry Ford Hospital, Detroit	do	17
	University of Michigan Medical Center, Ann Arbor	Public	9
Minn.	St. Paul-Ramsey Hospital & Medical Center, St. Paul	do	8
	St. Mary's Hospital, Rochester	Private	19
	University of Minnesota Hospitals, Minneapolis	Public	18
Mo.	Barnes Hospital, St. Louis	Private	15
	St. Louis University Hospitals, St. Louis	do	12
N.Y.	Grasslands Hospital, Valhalla	Public	9
	N.Y. State Dept. of Mental Hygiene (Food Service Administration), Poughkeepsie.	do	8
	New York Hospital, New York	Private	19
	U.S. Public Health Service Hospital, New York	Public	12
	Veterans' Administration Hospital, New York	do	12
N.C.	Duke University Medical Center, Durham	Private	12
Ohio	Cincinnati General Hospital, Cincinnati	Public	10
	Good Samaritan Hospital, Cincinnati	Private	18
	Miami Valley Hospital, Dayton	do	10
	St. Luke's Hospital, Cleveland	do	13
	Case Western Reserve University, Coordinated with:		
	Mount Sinai Hospital, Cleveland	do	5
	University Hospital of Cleveland	do	5
	U.S. Veterans' Administration Hospital, Cleveland	Public	6
Okla.	University of Oklahoma Medical Center, Oklahoma City	do	12
Oreg.	University of Oregon Medical School Hospitals and Clinics, Portland	do	11
Pa.	Shadyside Hospital, Pittsburgh	Private	6
P.R.	University of Puerto Rico, Rio Piedras	Public	7
Tenn.	Vanderbilt University Hospital, Nashville	Private	15
Tex.	Baylor University Medical Center, Dallas	do	8
	Brooke General Hospital, Fort Sam Houston	Public	16
	Veterans' Administration Hospital, Houston	do	16
Utah	Latter-Day Saints Hospital, Salt Lake City	Private	8
Va.	Medical College of Virginia, Richmond	Public	14
Wash.	Seattle Internship for Hospital Dietitians (King County Harborview Hospital; Swedish Hospital; Children's Orthopedic Hospital), Seattle.	Public-private	13
Wis.	University Hospitals, University of Wisconsin, Madison	Public	10
	Milwaukee County Institutions, Milwaukee	do	11
	Business and industry internships		
Conn.	Aetna Life and Casualty, Hartford	Private	6
N.Y.	Eastman Kodak Company, Rochester	do	10
Ohio	Stouffer Foods Corporation, Cleveland	do	4
	College and university internships		
Okla.	Oklahoma State University, Stillwater	Public	6
Wash.	University of Washington, Seattle	do	16
	State institutions and agencies		
Pa.	Institutional Food Research and Services, Pennsylvania State University, University Park.	do	6

[1] Includes 9 seniors in the Medical Dietetics program at the Ohio State University.

Source: The American Dietic Association.

Table 54. SCHOOLS OFFERING MASTER'S DEGREES IN PUBLIC HEALTH NUTRITION AND NUMBERS OF STUDENTS AND GRADUATES: SELECTED YEARS, 1949-50 THROUGH 1967-68

Academic year	Schools	Students	Graduates	Academic year	Schools	Students	Graduates
1967–68	15	209	84	1961–62	12	73	56
1966–67	14	155	86	1960–61	11	44	33
1965–66	14	135	70	1959–60	10	49	40
1964–65	14	117	73	1954–55	10	38	36
1963–64	13	116	72	1949–50	6	37	34
1962–63	13	80	46				

Source: The individual schools.

Table 55. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING MASTER'S DEGREES IN PUBLIC HEALTH NUTRITION AND NUMBER OF STUDENTS AND GRADUATES: 1967-68

Location	School	Ownership	Students	Graduates
	Total, 15 schools		209	84
Calif	University of California, School of Public Health, Berkeley	Public	18	12
	University of California, School of Public Health, Los Angeles	do	36	10
Hawaii	University of Hawaii, School of Public Health, Honolulu	do	3	—
Mass	Harvard University, School of Public Health, Boston	Private	6	3
	Massachusetts Institute of Technology, Cambridge [1]	do	48	3
Mich	University of Michigan, School of Public Health, Ann Arbor	Public	10	5
Minn	University of Minnesota, School of Public Health, Minneapolis.	do	5	2
N.Y	Columbia University, School of Public Health, New York	Private	17	17
	Columbia University Teachers College, New York	do	8	3
	Cornell University, Graduate School of Nutrition, Ithaca	do	3	2
N.C	University of North Carolina, School of Public Health, Chapel Hill.	Public	7	5
Ohio	Case Western Reserve University, Department of Nutrition, Cleveland.	Private	23	12
Pa	Pennsylvania State University, College of Home Economics, University Park.	do	7	—
Tenn	University of Tennessee, College of Home Economics, Knoxville.	Public	10	5
P.R	University of Puerto Rico, San Juan	do	8	5

[1] Degrees are granted in nutrition, biochemistry and metabolism.

Source: Individual schools.

CHAPTER 10

Economic Research in the Health Field

The major functions of the *health economist*, whether he is or is not formally trained in economics, are to appraise health as an economic asset and to analyze ways in which the provision of health care goods and services affects the health of individuals and hence the well-being of families and nations. Usually health economic research activities are grouped into five broad categories related to health—financing, organization, facilities, utilization, and manpower. Health economic research provides information essential for decision making in both public and private agencies.

In a program setting, the health economist makes his contribution mainly through research and analytical studies rather than through the provision of services. For this reason the field will remain relatively small, in relation to personnel who provide health services, in the foreseeable future. Approximately 500–600 persons were employed as health economists in 1967 according to an estimate provided by the Health Economics Analysis Program, National Center for Health Services Research and Development, Health Services and Mental Health Administration.

Basic research in health economics is carried out primarily by economists employed in universities and research foundations. Applied research in health economics is frequently the responsibility of the health economist employed by large health-related organizations. Examples of large organizations employing health economists are the Health Services and Mental Health Administration and other components of the U.S. Department of Health, Education, and Welfare; State and local health departments; national professional health societies; and voluntary health agencies.

The responsibilities of a health economist who is employed at a university vary depending upon the orientation of the university. A faculty member who teaches health economics is likely to spend more time in teaching other aspects of economics than he devotes to health. Frequently, the university economist combines teaching with research activities and occasional outside consultations. Some faculty members have research appointments only, with no teaching responsibilities; others may have joint teaching appointments both in the university's department of economics or business school and in the school of public health or school of medicine. In organizations other than universities and research foundations, health economists are usually a part of the overall administrative staff with responsibility for conducting specialized studies. They frequently serve as advisers and consultants in program analysis, and in the development of new programs. In these situations the health economist provides information on program costs, value of the program to the economy, and various aspects of supply and demand.

A bachelor's degree with a major in economics is usually required for most beginning jobs in health economics in both government and private industry. A master's degree, and usually a doctorate, is required for career appointments at universities and research foundations.

Information on the number of degrees conferred in economics is given in tables 56 and 57. No information is available on degrees with specialization in health economics.

At present, few courses limited to health economics are offered. However, a small number of graduate schools and schools of public health offer such specific courses. At other schools, the subject matter of health economics is taught as part of a more comprehensive course such as economic development, social insurance, investment in human resources, welfare economics, hospital administration, or medical care administration. With the increased interest in health economics, more schools are beginning to attract qualified faculty to offer courses and to do research specific to health economics. It is anticipated that more graduate schools will begin to develop teaching programs geared to the student whose major area of concentration is health economics.

Table 56. EARNED DEGREES CONFERRED IN ECONOMICS: 1960-61 THROUGH 1966-67

Academic year	Bachelor's degree	1st professional requiring 6 or more years [1]	Master's degree	Doctor's degree
1966–67	13,058	—	1,778	546
1965–66	11,585	—	1,528	458
1964–65	10,875	20	1,268	410
1963–64	10,582	25	1,111	385
1962–63	9,399	—	1,029	331
1961–62	8,387	18	853	268
1960–61	7,939	—	820	266

[1] For years prior to 1965–66, the requirement was 5 or more years.

Sources: National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1965–66.* OE–54013A–66. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Also prior annual issues. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands.

National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part A—Summary Data, 1966–67.* OE–54013–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Data for United States, Canal Zone, Guam, Puerto Rico, and the Virgin Islands.

Table 57. LOCATION OF SCHOOLS CONFERRING DEGREES IN ECONOMICS AND NUMBER OF GRADUATES: 1966-67

Location	Graduates			Location	Graduates		
	Bachelor's degree	Master's degree	Doctor's degree		Bachelor's degree	Master's degree	Doctor's degree
Total, 691 schools	13,058	1,778	546	Missouri	216	41	6
				Montana	27	7	—
				Nebraska	72	12	4
Alabama	118	9	2	Nevada	15	2	—
Alaska	2	—	—	New Hampshire	141	5	—
Arizona	45	13	—	New Jersey	332	20	19
Arkansas	36	1	2	New Mexico	31	8	—
California	1,215	190	48	New York	1,704	233	72
Colorado	158	42	5	North Carolina	413	22	28
Connecticut	282	82	15	North Dakota	103	11	—
Delaware	12	3	—	Ohio	718	75	16
District of Columbia	190	53	8	Oklahoma	115	12	5
Florida	188	21	5	Oregon	152	24	4
Georgia	119	16	—	Pennsylvania	896	86	33
Hawaii	16	9	—	Rhode Island	149	8	5
Idaho	14	—	1	South Carolina	56	5	—
Illinois	478	121	48	South Dakota	71	4	—
Indiana	415	77	23	Tennessee	164	40	8
Iowa	218	19	9	Texas	404	84	11
Kansas	119	18	5	Utah	120	15	3
Kentucky	75	9	4	Vermont	118	1	—
Louisiana	137	19	11	Virginia	264	4	12
Maine	99	1	—	Washington	278	18	11
Maryland	215	22	15	West Virginia	68	—	—
Massachusetts	849	126	63	Wisconsin	520	57	20
Michigan	466	99	17	Wyoming	13	6	—
Minnesota	327	18	6				
Mississippi	25	8	2	Puerto Rico	80	2	—

Source: National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part B—Institutional Data, 1966–67.* OE-54013–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968.

CHAPTER 11

Enviromental Control*

The Nation's growth and productivity have resulted in many new and complex environmental problems which seriously challenge man's health and well-being. Included are problems related to the contamination of air, water, soil, and food; occupational and community stresses; noise; temperature; vibration; inadequate housing and work environments; highway and home hazards; radiation; and other hazards.

The acute awareness of these problems and the need for effective approaches to the prevention of environmental hazards to man are evident in the recent reports of the Environmental Pollution Panel of the President's Science Advisory Committee (*23*), the National Academy of Sciences, National Research Council (*24*), the Task Force on Environmental Health and Related Problems (*25*), and the establishment of an Environmental Quality Council and the Citizens Advisory Committee on Environmental Quality.

A distinctive characteristic of the manpower engaged in environmental control is the diversity in their functions and in their training and educational background. The prevention and control of complex problems of the environment require the participation of a wide range of personnel. These include: chemists, ecologists, physicists and biologists of many specialties; hydrologists, meteorologists, and oceanographers; engineers; sanitarians; physicians of several specialties; economists and political scientists.

The following kinds of personnel are engaged in environmental control activities: (1) scientific and technical specialists to carry out prevention and control programs; (2) planners/managers to plan, implement and direct general and specific programs; (3) scientists to carry out relevant basic and applied research and development; (4) technicians and aides to assist professional personnel in investigations, surveys and field work; and (5) teachers for instruction at all levels of training.

The absence of a comprehensive roster of qualified personnel primarily concerned with environmental protection in the United States was pointed out at a conference on Educational Needs in Environmental Health held in 1962 (*26*). At present, deterrents to the development of a meaningful roster include a lack of understanding of (1) the roles and functions of the various disciplines and (2) the interpretation of occupations in terms of basic discipline versus categorical program specialization. While neither of these factors is peculiar to the field of environmental protection, little progress has been made in developing a better understanding in this rapidly developing and expanding field. There is an urgent need to define more clearly the roles and functions of these disciplines.

Historically, an effort has been made to delineate the manpower situation in two basic environmental disciplines: environmental engineering and sanitary sciences. Little or no meaningful data are currently available for other basic disciplines.

In 1968, the total number of persons employed in environmental control exceeded 200,000—an estimate based on 13,500 engineers, 11,000 scientists, 12,000 sanitarians, 18,000 program specialists, 64,000 technicians and 99,000 aides and assistants. The latter figure is substantially more than had been estimated for technicians and aides in the previous editions of this publication.

Environmental Engineer

The *environmental engineer* applies engineering principles to the prevention, control, and management of environmental factors that influence man's physical, mental, and social health and well-being. During the last decade the need for a comprehensive view of all environmental factors and their interrelationships has broadened the opportunities for engineers. Prior to that time, the engineer was primarily concerned with such factors as water supply and water pollution, and thus the use of the occupational title "sanitary

* This chapter was prepared by the Public Health Service, Manpower Office, Consumer Protection and Environmental Health Service.

engineer" was not inappropriate. The more comprehensive outlook validates the title of "environmental engineer".

According to the latest estimates, a total of 13,500 environmental engineers were employed in this country in 1968. Of those, some 10,000 were the counterpart of the earlier "sanitary engineers". The remaining 3,500 are essentially environmental engineers engaged in the broad area of public works with major responsibilities for such environmental practices as public water supply, community waste disposal and housing control activities.

An earlier survey indicated about 5,000 practicing sanitary engineers in 1950 (*27*). In 1956, the National Science Foundation and the Public Health Service cooperated in developing the sanitary engineer portion of the National Register of Scientific and Technical Personnel (*28*). The survey was repeated biennially until 1964 when the Register was expanded to a more representative cross section of the entire engineering profession (*29*).

Characteristics of the survey respondents in 1962 are presented in table 58. About one-third of the engineers were employed by State and local governments, one-third by private industry and business, and the balance by the Federal Government and other organizations. Management or administration was the most important function, with nearly one-third of the respondents engaged in that activity.

There are a number of professional organizations concerned with the field of environmental engineering. Eight of these organizations (*30*) have joined in sponsoring the Environmental Engineering Intersociety Board, Inc. (formerly the American Sanitary Engineering Intersociety Board, Inc.). The objectives of the Board are to improve the practice, elevate the standards, and advance the cause of environmental engineering. Certification as a Diplomate of the American Academy of Environmental Engineers (AAEE) is awarded by the Board, based upon compliance with educational and experience standards, State licensure, and satisfactory completion of a written examination. Currently, the Board certifies environmental engineers in four subspecialities: air pollution control, industrial hygiene, radiation and hazard control, and sanitary engineering. The AAEE Roster at the end of 1968 lists over 1,100 persons in the United States.

All States require licensing of professional engineers. The educational, experience, and examination requirements for licensure vary.

Sanitarian

The *sanitarian* applies his knowledge of the principles of the physical, biological and social sciences to the improvement, control, and management of man's environment.

According to the most recent figures available, an estimated 12,000 sanitarians were employed in 1968. Prior estimates by the Public Health Service combined the data for sanitarians and sanitarian technicians and showed about 5,000 in 1950 and 11,000 in 1960 for the combined groups.

The first national survey of persons who regarded themselves as sanitarians was conducted in 1962. State and county governments were the major employers. Inspection, testing, and control were the major activities of half of those answering the survey questionnaire. Two-thirds indicated a specialization in milk, food, and meat technology (table 59).

The following 32 States are known to require the registration or licensing of sanitarians: Alabama, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Montana, Nebraska, Nevada, New Jersey, New Mexico, North Carolina, Oklahoma, Oregon, South Carolina, South Dakota, Tennessee, Texas, Utah, Washington, West Virginia, and Wisconsin.

In 1960, a model registration act was developed by the Sanitarians Joint Council which is made up of representatives from the International Association of Milk, Food and Environmental Sanitarians (3,000 members), the National Association of Sanitarians (6,000 members), and the American Public Health Association. The minimum requirements for sanitarians under the model act are: (1) a bachelor's degree with a minimum of 30 semester hours of academic work in environmental health or in the physical and biological sciences, (2) employment full-time as a sanitarian for not less than 2 years, and (3) successful completion of an examination given and conducted by a State registration board. Increasingly, employers of sanitarians are following these requirements in employment practices.

A number of professional organizations are concerned with the field of environmental quality

management. Three of these organizations (*31*) sponsored the establishment of the American Intersociety Academy for Certification of Sanitarians (AIACS). The Academy is dedicated to the recognition of the professional quality and achievement of the sanitarians in the various fields of environmental health.

Certification as a diplomate of the Academy is based upon meeting educational and experience standards, State registration and satisfactory completion of a written and oral examination. The AIACS 1969 Roster lists about 300 persons.

Program Specialist

Environmental protection specialists may practice their basic discipline *per se* or acquire a categorical program specialization beyond their disciplinary specialization. In either case, these specialists can contribute more effectively if they are able to comprehend the interdisciplinary demands of environmental problems and if they have the ability to communicate and work with the other specialists in the field.

Three examples of categorical program specialists are discussed below:

1. *Industrial hygiene personnel* may include industrial hygienists, engineers, chemists, toxicologists, occupational hygienists, environmental hygienists or similar designations. Basic industrial hygiene activities include the recognition, evaluation, and control of those environmental factors which have an adverse effect on health and efficiency of workers in places of employment. These specialists are essentially concerned with four significant categories:

(1) stresses associated with chemical agents such as dusts and gases;
(2) physical stresses such as temperature extremes, radiation and noise;
(3) biological hazards including insects and fungi; and
(4) other work-related stresses such as monotony and work pressure.

The industrial hygienist may make direct measurements of the industrial environment, evaluate the degree of exposure to the contaminant or stress, and recommend or design control measures. He may work with industrial physicians to institute nonengineering measures for control and correction of hazards. The occupational health programs in large organizations may also be staffed with chemists, toxicologists, physicists, nurses, and laboratory personnel. Data are available for the staffing of State and local governmental units (table 60).

The latest estimate available indicates that nearly 1,600 industrial hygienists were employed in the United States in 1968, more than double the number in 1950. Many of them work in a manufacturing setting, but increasing numbers are being employed by transportation companies, public utilities, mining operations, insurance companies, universities, and health and labor departments.

The major professional associations concerned with industrial hygiene are the American Industrial Hygiene Association (1,600 members in 1968), the American Conference of Governmental Industrial Hygienists (1,050 members), and the Occupational Health Section (700 members) of the American Public Health Association.

The first two of these serve as sponsors of The American Board of Industrial Hygiene, an organization established in 1960 to improve the practice and educational standards of industrial hygienists. Certification as a diplomate of the American Academy of Industrial Hygiene is awarded by the Board based upon a system of written and oral examinations. By 1969, the Board had certified 565 persons. Requirements for certification include (a) graduation with a baccalaureate degree in chemistry, physics, chemical, mechanical or sanitary engineering, biology, or other acceptable major subject and (b) eight years of responsible full-time practice in industrial hygiene.

2. *Radiation protection personnel* at the professional level include health physicists and other scientists with special training in the health aspects of radiation. The radiation exposure problems with which they are concerned are associated with the use of electronic products, X-ray machines, radioactive materials, nuclear reactors, and particle accelerators, as well as environmental radioactive contamination. Their work is conducted principally in industrial, medical, research, or education institutions that use radiation sources and in health agencies that have responsibility for protection of the public health. Approximately 4,300 radiation protection personnel including technicians were employed in 1968 (table 61).

Several professional associations and societies serving radiation protection objectives provide opportunity for membership, such as the Health

Physics Society (3,000 members), Radiological Health Section (350 members) of the American Public Health Association, American Association of Physicists in Medicine (450 members), and the American College of Radiology. The first three of these serve as sponsors of the American Board of Health Physics, an organization established in 1959 to improve the practice and elevate the standards of health physics. Through a system of written and oral examinations, by 1969 the Board had certified almost 500 people as professionally qualified to assume higher level positions in health physics. Requirements for certification include (a) graduation with a bachelor's degree in a physical science, or a biological science with a minor in a physical science, and (b) 6 years of responsible professional experience in health physics, 3 years of which must have been in applied radiation protection work.

3. *Air pollution control personnel* include engineers, chemists, meteorologists, statisticians, physicists, biologists, sanitarians, technicians, and inspectors. The principal activities which comprise air pollution control programs are: (a) identification and measurement of chemical pollutants and airborne particulate matter within the atmosphere, (b) measurement and analysis of the effects of meteorological variables on atmospheric pollution conditions, (c) determination of the effects of air pollution on biological systems and inorganic materials, (d) control of sources of air pollution including industrial production processes, combustion and space heating equipment, and vehicular sources, (e) development, installation, and operation of a variety of processes and equipment designed to reduce or eliminate the emission of air pollutants, (f) development and enforcement of air quality and emission standards, and (g) coordination and integration of air pollution control efforts with other environmental health activities and with diverse industrial and governmental programs and agencies conducting activities which affect, directly or indirectly, the quality of the air.

There are presently about 1,400 professional and 900 technical personnel employed in State and local governmental air pollution programs (table 62). There are also approximately 500 full-time professionals employed in the Federal air pollution control program. No statistics on the number of personnel employed by the private sector and by universities for air pollution activities are available, but it is probable that the number exceeds Federal, State, and local personnel combined.

The Air Pollution Control Association (4,500 members) is the major professional society concerned with air pollution. Other societies such as the American Industrial Hygiene Association, American Society of Civil Engineers, American Society of Mechanical Engineers, and the American Public Health Association also have major committees related to air pollution.

Technician and Aide

Environmental engineers, sanitarians and other program specialists may have the assistance of technicians and/or aides. The *environmental technician* assists professional personnel in carrying out the various elements of prevention and control programs, including inspections, surveys, investigations, and evaluations to determine compliance with laws and regulations. He obtains appropriate samples of air, food, and water, and assists in performing tests to determine the quality of these samples. He assists in operating water purification waste water treatment plants, and solid wastes disposal facilities. There were approximately 64,000 technicians employed in the United States in 1968.

The *environmental aide* assists professional personnel and technicians in carrying out the various elements of prevention, control and service programs. He performs routine tasks under supervision. It is estimated that 99,000 aides were employed in 1968 in public water supply, waste water collection and treatment, industrial wastes disposal, solid wastes collection and disposal, community sanitation and rodent control activities, industrial safety, air pollution control and recreational management.

Education and Training

The minimum educational requirement for environmental engineers, sanitarians, and other environmental specialists is the baccalaureate degree. However, the trend is towards a requirement of graduate education is one of the basic disciplines or in an area of categorical program specialization. In several basic disciplines the qualifying professional degree is the doctorate.

A number of graduate educational programs in environmental protection are supported by several

Federal agencies (table 63). In 1968, stipend support for full-time, long-term training, including research training, was provided for some 768 engineers, 65 sanitarians, and 991 environmental specialists. These totals include Public Health Service stipend support for some 365 engineers, 65 sanitarians, and 729 specialists (table 64).

Most engineers now enter the environmental health field at the baccalaureate level, having completed curriculums in civil, chemical, or mechanical engineering. At the graduate level, 264 masters and 38 doctoral degrees in environmental engineering or sanitary engineering *per se* were awarded in the academic year 1967–68 (table 65). In addition, at least twice as many other graduate degrees were awarded in other fields of engineering for completion of similar academic programs.

The minimum educational requirement for the *sanitarian* is usually a baccalaureate with a major in environmental health or in the physical or biological sciences. Approximately 150 persons graduate annually with majors in environmental health. Presently, 33 academic institutions offer undergraduate 4-year programs in environmental health (table 66). In 1968, the National Association of Sanitarians initiated an accreditation program for undergraduate environmental health (or related) curricula.

The minimum appropriate educational requirement for the *environmental technician* is an associate degree in environmental health, radiologic technology, or related areas of specialization. A number of junior colleges or technical institutes offer technical training in environmental health or similar areas.

The *environmental aide* normally is a high school graduate with varying amounts of appropriate short-course training in specialized subjects.

A wide variety of short technical courses for environmental engineers, sanitarians, and other specialists are offered by the Public Health Service. In addition to the short courses conducted at PHS field stations, courses are offered at selected locations in the States in response to requests. Courses in water pollution control are being conducted by the Federal Water Pollution Control Administration, Department of the Interior. Short technical courses for continuing education are also offered by several other Federal agencies as well as by non-Federal institutions.

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(*29*) Engineers Joint Council: *Engineering Manpower in Profile (1964). A Report from the National Engineers Register.* New York, 1965.

(*30*) The eight are: Air Pollution Control Association, American Institute of Chemical Engineers, American Public Health Association, American Public Works Association, American Society for Engineering Education, American Society of Civil Engineers, American Water Works Association, and Water Pollution Control Federation.

(*31*) The three are: American Public Health Association, International Association of Milk, Food, and Environmental Sanitarians, and National Association of Sanitarians.

Table 58. TYPE OF EMPLOYER, WORK ACTIVITY, AND HIGHEST ACADEMIC DEGREE OF SANITARY ENGINEER SURVEY RESPONDENTS: 1962

Item	Number	Percent
Type of employer		
Total	[1] 4,923	100.0
Educational institution	362	7.4
Military and Public Health Service	366	7.4
Other Federal Government	296	6.0
State and local government	1,644	33.4
Nonprofit organization	36	0.7
Industry and business	1,622	32.9
Self-employed	431	8.8
Other	77	1.6
No report	89	1.8
Work activity		
Total	4,923	100.0
Research, development, or design	812	16.5
Management or administration	1,421	28.9
Teaching	247	5.0
Production and inspection	737	15.0
Other	1,640	33.3
No report	66	1.3
Highest academic degree		
Total	4,923	100.0
Less than bachelor's	175	3.6
Bachelor's	2,761	56.1
Master's	1,660	33.7
Doctorate	229	4.6
No report	98	2.0

[1] Survey respondents out of an estimated 6,500 to 7,500 sanitary engineers active in 1962.

Source: National Science Foundation: *American Science Manpower, 1962*. NSF 64-16. Washington. U.S. Government Printing Office, 1964.

Table 59. PRINCIPAL EMPLOYER, WORK ACTIVITY, AND SPECIALIZATION OF SANITARIAN SURVEY RESPONDENTS: 1962

Employer, primary activity, and specialty	All sanitarians
Number of respondents [1]	7,263
Percent by employer	100.0
Government	83.7
Federal	5.5
State	32.2
County	29.2
City	16.8
Nongovernment	16.3
Business	11.1
Education	2.3
Other	2.9
Percent by activity	100.0
Inspection, testing, control	50.3
Management, administration	22.6
General, production, sales, marketing, other	17.4
Consulting, research, teaching, writing	9.7
Percent by specialty	100.0
Milk	33.1
Food, meat	35.4
Water, refuse, wastes, vectors	16.2
Air pollution, radiation, and occupational health	2.8
Recreation, housing, other areas	12.5

[1] Completed questionnaires were returned by 7,902 sanitarians. These included 7,263 persons employed full time in environmental health activities.

Source: Pennell, M. Y., Light, I., and Taylor, D. W.: Sanitarians. *Health Manpower Source Book 16.* PHS Pub. No. 263, Section 16. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1963. Pages 11–18.

Table 60. OCCUPATIONAL HEALTH PERSONNEL EMPLOYED BY STATE AND LOCAL GOVERNMENTS: JANUARY 1969

Occupation	Total personnel[1]	State agencies		Local health departments
		Health	Labor	
All occupations	702	432	98	172
Industrial hygienists and engineers	290	167	52	71
Physicians (consultation and employee health)	45	31	7	7
Nurses (consultation and employee health)	44	33	2	9
Chemists and technicians	108	75	19	14
Sanitarians	45	5	—	40
Radiological health staff [2]	71	46	17	8
Air pollution staff [2]	69	48	—	21
All other	30	27	1	2

[1] Full-and part-time employees in 82 occupational health units—42 States (plus D.C. and Puerto Rico) and 16 local. Includes radiation, air pollution, and employee health services personnel when part of, or associated with, formal occupational health programs.

[2] Includes radiation protectionists, air pollution specialists, and others listed separately under these segments of programs.

Source: Occupational Health Program: *Directory of Governmental Occupational Health Personnel: January 1969.* Public Health Service, U.S. Department of Health, Education, and Welfare. 29th annual issue. Analysis based on Directory listing of personnel. Data for United States and Puerto Rico.

Table 61. RADIATION PROTECTION PERSONNEL EMPLOYED IN THE UNITED STATES: 1967

Industry	Professional personnel	Technical personnel
Total employed	1,800	2,500
Nuclear energy industry	800	2,000
State and local health departments	400	400
Public Health Service, Bureau of Radiological Health	600	100

Sources: U.S. Atomic Energy Commission: 1967 occupational survey, as reported in the Bureau of Labor Statistics' *Occupational Outlook Handbook*, 1968–69 edition. Bulletin No. 1550. U.S. Department of Labor. Washington. U.S. Government Printing Office, 1968.

National Center for Radiological Health: *Report of State and Local Radiological Health Programs, Fiscal Year 1967.* Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office. July 1968.

Table 62. AIR POLLUTION CONTROL PERSONNEL EMPLOYED BY STATE AND LOCAL GOVERNMENTS: OCTOBER 1968

Occupation	Total personnel	Full-time employment	Part-time employment [1]
Total professional and technical	2,251	1,807	444
Total professional	1,387	1,041	346
Engineer	638	533	105
Chemist	239	189	50
Meteorologist	25	24	1
Sanitarian	265	144	121
Other professionals	220	151	69
Total technical	864	766	98
Technician	324	270	54
Inspector	540	496	44

[1] Persons employed on a full-time basis by agencies, but who spend only a portion of their working time in air pollution control activities.

Source: National Center for Air Pollution Control, Public Health Service.

Table 63. ACADEMIC INSTITUTIONS OFFERING GRADUATE PROGRAMS IN ENVIRONMENTAL PROTECTION SUPPORTED BY SELECTED FEDERAL GRANTS PROGRAMS: 1968

Location	School	Area of program emphasis [1]					
		Air pollution	Industrial hygiene	Radiation protection	Solid wastes	Water supply and/or water pollution	General [2]
	Total, 104 schools	24	21	34	10	80	56
Ala	Auburn University, Auburn			x		x	
	University of Alabama, University		x				
Alaska	University of Alaska, College		x			x	x
Ariz	University of Arizona, Tucson					x	
Ark	University of Arkansas, Fayetteville			x		x	
Calif	California Institute of Technology, Pasadena						x
	San Jose State College, San Jose					x	
	Stanford University, Stanford					x	x
	University of California, Berkeley		x				x
	University of California, Davis					x	x
	University of California, Los Angeles		x	x			x
	University of California, Riverside	x					
	University of Southern California, Los Angeles	x					
Colo	Colorado State University, Fort Collins			x		x	
	University of Colorado, Boulder					x	
Conn	University of Connecticut, Storrs					x	
	Yale University, New Haven	x	x	x			x
Del	Delaware State College, Dover					x	
	University of Delaware, Newark					x	
Fla	University of Florida, Gainesville	x		x	x	x	x
	University of Miami, Coral Gables			x			
Ga	Emory University, Atlanta			x			
	Georgia Institute of Technology, Atlantic			x	x	x	x
	Georgia State College, Atlanta					x	
	University of Georgia, Athens						x
Hawaii	University of Hawaii, Honolulu					x	x
Idaho	University of Idaho, Moscow					x	
Ill	Illinois Institute of Technology, Chicago						x
	Northwestern University, Evanston			x		x	x
	University of Illinois, Urbana				x	x	x
Ind	Purdue University, Lafayette			x		x	x
	Rose Polytechnic Institute, Terre Haute						x
	University of Notre Dame, Notre Dame					x	x
Iowa	Iowa State University, Ames			x		x	x
	University of Iowa, Iowa City		x				x
Kans	Kansas State University, Manhattan		x			x	x
	University of Kansas, Lawrence			x	x	x	
Ky	University of Kentucky, Lexington	x				x	
La	Louisiana State University, Baton Rouge					x	x
	Tulane University, New Orleans						x
Maine	University of Maine, Orono					x	
Md	Johns Hopkins University, Baltimore		x	x		x	x
	University of Maryland, College Park	x				x	

See footnotes at end of table.

Table 63. ACADEMIC INSTITUTIONS OFFERING GRADUATE PROGRAMS IN ENVIRONMENTAL PROTECTION SUPPORTED BY SELECTED FEDERAL GRANTS PROGRAMS: 1968—Continued

Location	School	Area of program emphasis [1]					
		Air pollution	Industrial hygiene	Radiation protection	Solid wastes	Water supply and/or water pollution	General [2]
Mass.	Harvard University, Boston	x	x	x		x	x
	Massachusetts Institute of Technology, Cambridge						x
	Northeastern University, Boston					x	x
	Tufts University, Medford					x	x
	University of Massachusetts, Amherst	x				x	x
Mich.	Michigan State University, East Lansing					x	x
	University of Michigan, Ann Arbor	x	x	x	x	x	x
	Wayne State University, Detroit		x			x	x
Minn.	University of Minnesota, Minneapolis	x		x		x	x
Miss.	Mississippi State University, State College					x	
Mo.	University of Missouri, Columbia					x	
	Washington University, St. Louis						x
Mont.	Montana State University, Bozeman					x	
Nebr.	University of Nebraska, Lincoln					x	
Nev.	University of Nevada, Reno					x	
N.H.	University of New Hampshire, Durham					x	
N.J.	Rutgers, The State University, New Brunswick			x		x	x
N.Mex.	New Mexico State University, University Park					x	x
N.Y.	Columbia University, New York			x			x
	Cornell University, Ithaca					x	x
	CUNY City College, New York		x				
	Manhattan College, Bronx					x	
	New York University, New York	x		x		x	
	Rensselaer Polytechnic Institute, Troy			x	x		
	Syracuse University, Syracuse						x
	University of Rochester, Rochester		x				
N.C.	North Carolina State University at Raleigh, Raleigh					x	
	University of North Carolina, Chapel Hill		x	x		x	x
N. Dak.	North Dakota State University, Fargo			x		x	x
Ohio	Ohio State University, Columbus		x			x	x
	University of Akron, Akron					x	
	University of Cincinnati, Cincinnati	x	x	x		x	x
	University of Toledo, Toledo					x	
Okla.	Oklahoma State University, Stillwater					x	x
	University of Oklahoma, Norman		x	x		x	x
Oreg.	Oregon State University, Corvallis	x		x		x	x
Pa.	Drexel Institute of Technology, Philadelphia	x	x		x	x	x
	Pennsylvania State University, University Park	x				x	x
	Temple University, Philadelphia	x		x			
	University of Pennsylvania, Philadelphia			x			
	University of Pittsburgh, Pittsburgh	x	x	x		x	x

See footnotes at end of table.

Table 63. ACADEMIC INSTITUTIONS OFFERING GRADUATE PROGRAMS IN ENVIRONMENTAL PROTECTION SUPPORTED BY SELECTED FEDERAL GRANTS PROGRAMS: 1968—Continued

Location	School	Area of program emphasis [1]					
		Air pollution	Industrial hygiene	Radiation protection	Solid wastes	Water supply and/or water pollution	General [2]
R.I.	University of Rhode Island, Kingston					x	
S.C.	Clemson University, Clemson					x	
S. Dak.	South Dakota State University, Brookings					x	x
Tenn.	University of Tennessee, Knoxville			x		x	
	Vanderbilt University, Nashville	x				x	
Tex.	North Texas State University, Denton					x	
	Rice University, Houston				x	x	x
	Texas A. & M. University, College Station	x		x		x	
	University of Texas, Austin	x	x	x	x	x	x
Utah	University of Utah, Salt Lake City	x				x	
	Utah State University, Logan					x	
Vt.	University of Vermont, Burlington					x	
Va.	Virginia Polytechnic Institute, Blacksburg					x	x
Wash.	University of Washington, Seattle	x	x	x		x	x
	Washington State University, Pullman			x		x	
W. Va.	West Virginia University, Morgantown	x			x	x	x
Wis.	Marquette University, Milwaukee					x	
	University of Wisconsin, Madison	x				x	x
Wyo.	University of Wyoming, Laramie					x	
P. R.	University of Puerto Rico, Rio Piedras						x

[1] Includes research training in each program.

[2] Includes one or more of the following, as illustrations: Public health, injury control, toxicology, food protection, systems planning, etc.

Sources: Office of Research and Development, Federal Water Pollution Control Administration: *Water Pollution Control Research, Development, Demonstration and Training Projects, 1968 Grant and Contract Awards.* U.S. Department of the Interior, Washington. U.S. Government Printing Office, 1969.

Unpublished data from Public Health Service, Consumer Protection and Environmental Health Service, and National Institutes of Health; Department of the Interior, Office of Water Resources Research; Atomic Energy Commission.

Table 64. STIPENDS AWARDED UNDER SELECTED FEDERAL GOVERNMENT TRAINING PROGRAMS FOR GRADUATE STUDY IN ENVIRONMENTAL PROTECTION: 1968

Type of program [1]	All Federal agencies			Public Health Service		
	Environmental engineers	Sanitarians	Environmental specialists	Environmental engineers	Sanitarians	Environmental specialists
All programs	768	65	991	365	65	729
Air pollution	88		266	88		266
Radiation protection	54		252	54		171
Industrial hygiene			29			29
Solid wastes	24			24		
Water supply/water pollution	421	18	181	18	18	
General [2]	181	47	263	181	47	263

[1] Includes research training in each program.

[2] Includes one or more persons from such areas as: occupational health, toxicology, food protection, accident prevention, environmental/sanitary engineering.

Sources: Unpublished data from Department of Health, Education, and Welfare, Public Health Service-Consumer Protection and Environmental Health Service, and National Institutes of Health; Department of the Interior, Federal Water Pollution Control Administration; Atomic Energy Commission.

Table 65. EARNED GRADUATE DEGREES CONFERRED IN ENVIRONMENTAL ENGINEERING: SELECTED YEARS, 1950-51 THROUGH 1967-68

Academic year	Master's [1]	Doctor's [1]	Academic year	Master's [1]	Doctor's [1]
1967–68	264	38	1961–62	79	13
1966–67	178	28	1960–61	74	12
1965–66	181	23	1959–60	85	6
1964–65	133	13	1954–55	75	6
1963–64	126	22	1950–51	69	4
1962–63	95	10			

[1] Includes only those degrees conferred in environmental health and sanitary engineering per se. Does not include other engineering degrees conferred for similar programs.

Sources: National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part A—Summary Data, 1967–68.* OE–54013–68–A. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands. Also prior edition.

National Center for Educational Statistics: *Engineering Degrees.* OE–54006–66. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1967. Also prior editions.

Table 66. ACADEMIC INSTITUTIONS OFFERING UNDERGRADUATE PROGRAMS IN ENVIRONMENTAL HEALTH: 1969

Location	School [1]	Location	School [1]
	Total, 33 schools [2]	Louisiana	Louisiana State University, Baton Rouge
			McNeese State College, Lake Charles
Alabama	Troy State College, Troy	Massachusetts	University of Massachusetts, Amherst
Arkansas	Little Rock University, Little Rock	Michigan	Ferris State College, Big Rapids
California	California State College, Los Angeles	Missouri	University of Missouri, Columbia
	California State College, Long Beach	Montana	Montana State University, Bozeman
	Fresno State College, Fresno	New Jersey	Rutgers, The State University, New Brunswick
	Sacramento State College, Sacramento		
	San Diego State College, San Diego	Oklahoma	University of Oklahoma, Norman
	San Fernando State College, San Fernando.	Oregon	Oregon State University, Corvallis
			Portland State College, Portland
	San Jose State College, San Jose	South Dakota	South Dakota State University, Brookings.
Colorado	Colorado State University, Fort Collins		
District of Columbia.	George Washington University, Washington.	Tennessee	East Tennessee State University, Johnson City.
Florida	Florida State University, Tallahassee	Utah	Brigham Young University, Provo
Illinois	Southern Illinois University, Carbondale		Utah State University, Logan
		Washington	University of Washington, Seattle
Indiana	Indiana State University, Terre Haute		Washington State University, Pullman
	Indiana University, Indianapolis	Wisconsin	Wisconsin State University, Eau Claire
Kentucky	Eastern Kentucky University, Richmond		

[1] All public institutions except Little Rock University and Brigham Young University.
[2] Data not available on number of students enrolled in these courses.

Source: National Association of Sanitarians.

CHAPTER 12

Food and Drug Protective Services

Government and industry share in the efforts to protect health and lives through safeguarding the quality of food and drugs. Protective services are an important part of the work of several of the health manpower categories. Food technologists, government food and drug inspectors, and government food and drug analysts are discussed in this chapter, but the reader should also refer to chapter 24 on pharmacists, chapter 33 on veterinarians, and chapter 11 on sanitarians and other environmental health personnel.

Food Technologist

The *food technologist* applies science and engineering to the production, processing, packaging, distribution, preparation, and utilization of foods. His scientific knowledge and special skills are employed to solve technological problems connected with the development of new products, processes, or equipment; selection of raw materials; fundamental changes in the composition or physical condition of food for industrial processing, or the nutritional value and suitability of such foods for human consumption.

The Institute of Food Technologists (IFT) estimates that approximately 22,000 individuals were employed as food technologists in 1968. The majority of food technologists are employed by private industry. However, a survey of the nearly 10,000 IFT members showed that 16 percent are involved in research and teaching in educational and private research institutions, 7 percent are employed by government, and 7 percent offer consulting services to the food industry.

In terms of work activity, the greatest numbers are engaged in product development. Many others are involved in quality control, basic research, engineering, production, and packaging.

Almost one-fourth of the members of the Institute of Food Technologists have a doctorate, about one-fifth have a master's degree, the balance hold a bachelor's degree.

A bachelor's degree in food science or in a related science such as chemistry, biochemistry, biology, bacteriology, or in engineering is the minimum educational requirement for entrance into the field. Earned degrees conferred in food science and technology, in 1966–67 include 214 bachelor's, 149 master's, and 52 doctor's (tables 67 and 68).

Government Food and Drug Inspector and Analyst

Both the Federal Government and the States have food and drug laws which are enforced by two units of the Federal Government and by State and local health agencies. The Food and Drug Administration of the U.S. Department of Health, Education, and Welfare has broad responsibilities for food and drug protective services and employs inspectors and analysts who are concerned with the purity and safety of food, drugs, and cosmetics and with the effectiveness of drugs.

In 1955, the Food and Drug Administration had fewer than 900 total employees; in 1960, over 1,500; and by 1968, nearly 4,400. The Meat Inspection Branch of the U.S. Department of Agriculture which regulates all meat food products in interstate commerce also employs food inspectors, most of whom are veterinarians. (See ch. 33.) The State and local health agencies handle the inspection in various ways.

The FDA *food and drug inspector* trys to provide protection before the product reaches the consumer by checking the processes involved from raw material to delivery, including the conditions under which it is manufactured and the package labeling. The inspector is usually a college graduate with a science major. In 1968, FDA employed 700 food and drug inspectors.

The FDA *food and drug analyst* provides more intensive checking of the inspector's samples for purity and whether they comply with their labels. These experts engage in research work on the safety and effectiveness of products and on the development of methods for analysis. In 1968, FDA employed 700 food and drug analysts.

The minimum educational requirement for a laboratory analyst is 4 years of college, with a major in chemistry, bacteriology, pharmacology or related science. A master's or a doctor's degree in the field of specialization is preferred for the research analyst's top positions.

Table 67. EARNED DEGREES CONFERRED IN FOOD SCIENCE AND TECHNOLOGY: 1960-61 THROUGH 1966-67

Academic year	Bachelor's degree	Master's degree	Doctor's degree	Academic year	Bachelor's degree	Master's degree	Doctor's degree
1966-67	214	149	52	1962-63	121	58	30
1965-66	240	123	57	1961-62	108	49	19
1964-65	208	103	34	1960-61	77	45	17
1963-64	109	84	37				

Sources: National Center for Educational Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1965-66*. OE-54013A-66. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Also prior annual issues.

National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part A—Summary Data, 1966-67*. OE-54013-67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968.

Table 68. LOCATION OF SCHOOLS THAT OFFER TRAINING IN FOOD SCIENCE AND TECHNOLOGY, 1969, AND NUMBER OF GRADUATES: 1966-67

Location	School [1]	Bachelor's degree	Master's degree	Doctor's degree
	Total, 49 schools	214	149	52
Ala	Auburn University, Auburn[2]	1	—	—
	Tuskegee Institute, Tuskegee Institute[2]	—	3	—
Ark	University of Arkansas, Fayetteville	—	—	—
Calif	California State Polytechnic College, Poloma[2]	3	—	—
	California State Polytechnic College, San Luis Obispo[2]	16	—	—
	Fresno State College, Fresno[2]	3	—	—
	University of California, Berkeley	1	—	—
	University of California, Davis	16	21	—
Conn	University of Connecticut, Storrs	4	—	—
Fla	University of Florida, Gainesville	4	—	—
Ga	University of Georgia, Athens	17	8	3
Hawaii	University of Hawaii, Honolulu	—	3	—
Idaho	University of Idaho, Moscow[2]	1	—	—
Ill	University of Illinois, Urbana	6	8	8
Ind	Purdue University, Lafayette	5	—	—
Iowa	Iowa State University of Sci. and Tech., Ames	3	8	2
Kans	Kansas State University of Agric. and App. Sci., Manhattan[2]	8	7	—
La	Louisiana State University, Baton Rouge	—	4	1
	Southeastern Louisiana College, Hammond[2]	4	—	—
	University of Southwestern Louisiana, Lafayette[2]	1	—	—
Md	University of Maryland, College Park	—	3	1
Mass	Massachusetts Institute of Technology, Cambridge	—	—	—
	University of Massachusetts, Amherst	10	9	11
Mich	Michigan State University, East Lansing	8	17	7
Minn	University of Minnesota, Minneapolis	2	4	1
Miss	Mississippi State University State College	—	—	—
Mo	University of Missouri, Columbia	—	—	—
Nebr	University of Nebraska, Lincoln	—	—	—
N.J	Rutgers, The State University, New Brunswick	7	3	4
N. Y	Columbia University, New York	—	—	—
	Cornell University, Ithaca	2	8	2
N. C	North Carolina State University, Raleigh	2	4	—
N. Dak	North Dakota State University, Fargo[2]	—	5	—
Ohio	Ohio State University, Columbus	17	3	1
Oreg	Oregon State University, Corvallis	22	8	1
Pa	Delaware Valley College of Sci. and Agric., Doylestown[2]	5	—	—
	Pennsylvania State University, University Park	16	—	—
R. I	University of Rhode Island, Kingston	—	3	—
S. C	Clemson University, Clemson	—	—	—
S. Dak	South Dakota State University, Brookings[2]	2	—	—
Tenn	University of Tennessee, Knoxville	11	6	—
Tex	Texas A. & M. College, College Station	—	3	—
	Texas Technological College, Lubbock[2]	4	1	—
Utah	Utah State University, Logan	—	1	2
Va	Virginia Polytechnic Institute, Blacksburg	—	—	—
Wash	University of Washington, Seattle	2	—	—
	Washington State University, Pullman	—	1	1
Wis	University of Wisconsin, Madison	9	8	7
Wyo	University of Wyoming, Laramie[2]	2	—	—

[1] All public institutions except Columbia University, Cornell University, Delaware Valley College of Sci. and Agric., and Tuskegee Institute.
[2] Not on IFT list for 1969.

Sources: Institute of Food Technologists for list of institutions.

U.S. National Center for Educational Statistics: *Earned Degrees Conferred 1966–67*. OE–54018–67–B. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968.

CHAPTER 13

Health and Vital Statistics

The growing importance of statistics and statistical methods is a direct result of the increasing complexity of the activities within the health field. Statistical data are required in administrative planning, conduct of health programs, and evaluation, as well as in research and interpretation of the health needs of the community to the public. The scope of the field includes the collection, processing, analysis, and publication of health statistics including medical and vital statistics. (See also the chapters on administration of health services in health departments, automatic data processing, and medical records.)

Health statisticians—sometimes called *biostatisticians*—are primarily concerned with the use of statistical theory, techniques, and methods to determine useful measurements or meaningful relationships of quantified information on a particular subject relating to health or disease. They help in identifying and measuring health problems as a basis for planning and evaluating progress of programs and also in the scientific study of the causes, processes, and cures of disease. Another major function of the health statistician is to devise special studies and analyses for use in planning and evaluating health services.

According to a 1968 survey conducted by the Statistics section of the APHA, there were about 1,100 statisticians active in the health field in 1968. Statisticians in the health field belong to a number of professional associations. The 772 members of the Statistics Section of the American Public Health Association, Inc. (APHA), probably represents most of the total workers. In addition, there are a number of health statisticians in the Mental Health, Medical Care, and Maternal and Child Health Sections of the APHA; in the Biometrics Section of the American Statistical Association (ASA); and in the Eastern and Western North American Regions of the Biometric Society. The majority are employed by Federal, State, or local governments (tables 7 and 9, Introduction). Others work in voluntary health agencies, industrial organizations, insurance companies, hospitals, and schools.

A bachelor's degree with courses in mathematics, biological sciences, social sciences and physical sciences is the usual requirement for beginning positions as health statisticians. Advanced training in statistics and public health leading to a master's or doctor's degree is desirable. In 1967–68, U.S. schools of public health awarded graduate degrees to 59 statisticians, 33 of whom were sponsored by the U.S. Public Health Service (table 6, Introduction). The numbers of earned degrees in statistics are presented in tables 69 and 70.

The less complex and routine statistical functions are performed by *statistical clerks* who usually have a background of high school mathematics. They may abstract material from technical reports and prepare code sheets from which data can be summarized or tabulated. Other duties are to help analyze statistical data, compute and verify statistical tables, draft graphic presentations, and maintain files of records and worksheets. Estimates of the numbers of statistical clerks currently employed in the health field are not available.

Vital record registrars may be public health statisticians or persons with educational backgrounds in business administration, law, science, or arts. State registrars direct and coordinate the collection, certification and in most instances the processing of vital records. They supervise about 9,000 registrars at the local level in the registration of birth and death certificates plus over 3,000 civil clerks in the registration of marriage and divorce certificates. They promote revisions in record forms, legislation, and regulations, and make final decisions on registration problems and the issuance of certifications. Probably fewer than 300 persons qualify through education and experience to perform all of the professional functions of the position. Several thousand persons have subordinate positions in the field of vital records (tables 7 and 9, Introduction).

Health demographers have interests similar to those of health statisticians and vital record registrars, but with greater concentration on the

measurement of the elements of population growth such as factors associated with family formation and dissolution, fertility, death and the relation of these factors to economic development. Demographers are represented in the health field in small numbers. Most of these are members of the Population Association of America and to a lesser extent to the International Union for the Scientific Study of Population. In addition, many are members of other professional societies including the APHA and the ASA.

Table 69. EARNED DEGREES CONFERRED IN MATHEMATICS AND STATISTICS: 1960-61 THROUGH 1966-67

Academic years	Mathematics				Statistics			
	Bachelor's degree	1st professional requiring 6 or more years [1]	Master's degree	Doctor's degree	Bachelor's degree	1st professional requiring 6 or more years [1]	Master's degree	Doctor's degree
1966-67	21,060	—	4,801	730	248	—	483	102
1965-66	19,842	3	4,387	676	248	—	385	106
1964-65	19,256	14	3,853	606	294	17	295	76
1963-64	18,391	28	3,346	520	258	—	257	76
1962-63	15,923	25	3,051	433	173	—	272	57
1961-62	14,509	1	2,464	348	100	—	216	48
1960-61	13,047	—	2,098	292	80	—	140	52

[1] Prior to 1965–66, the requirement was 5 or more years.

Sources: National Center for Education Statistics: *Summary Report on Bachelor's and Higher Degrees Conferred During the Year 1965–66.* OE–54013A–66: Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968. Also prior annual issues. Data for United States, Canal Zone, Puerto Rico, and the Virgin Islands.

National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part A—Summary Data, 1966–67.* OE–54013–67. Office of Education, U.S. Department of Health, Education and Welfare. Washington. U.S. Government Printing Office, 1968. Data for United States, Canal Zone, Guam, Puerto Rico, and the Virgin Islands.

Table 7C. LOCATION AND OWNERSHIP OF SCHOOLS CONFERRING DEGREES IN STATISTICS AND NUMBER OF GRADUATES: 1966-67

Location	School	Ownership	Graduates		
			Bachelor's degree	Master's degree	Doctor's degree
	Total, 71 schools		248	483	102
Ariz.	University of Arizona, Tucson	Public	2	—	—
Calif.	California State College, Los Angeles	do	4	1	—
	California State College, Hayward	do	1	—	—
	Stanford University, Stanford	Private	7	45	4
	University of California, Berkeley	Public	14	24	10
	University of California, Los Angeles	do	—	8	3
Colo.	Colorado State University, Fort Collins	do	—	4	—
	University of Denver, Denver	Private	1	5	—
Conn.	University of Connecticut, Storrs	Public	1	4	2
	Yale University, New Haven	Private	—	4	—
Del.	University of Delaware, Newark	Public	—	4	—
D.C.	American University, Washington	Private	1	2	—
	George Washington University, Washington	do	7	2	2
Fla.	Florida State University, Tallahassee	Public	6	10	2
	University of Florida, Gainesville	do	9	5	—
Ga.	Emory University, Atlanta	Private	—	1	1
	Georgia State College, Atlanta	Public	6	4	—
	University of Georgia, Athens	do	—	3	—
Ill.	University of Illinois, Urbana	do	9	3	1
	University of Chicago, Chicago	Private	—	16	3
Ind.	Purdue University, Lafayette	Public	—	15	3
Iowa	Drake University, Des Moines	Private	8	—	—
	Iowa State University of Science & Technology, Ames.	Public	14	12	5
	University of Iowa, Iowa City	do	—	20	1
Kans.	Kansas State University of Agriculture & Applied Science, Manhattan.	do	6	20	—
La.	McNeese State College, Lake Charles	do	2	—	—
Md.	Johns Hopkins University, Baltimore	Private	—	—	6
	University of Maryland, College Park	Public	5	2	—
Mass.	Harvard University, Cambridge	Private	3	1	5
	Northeastern University, Boston	do	—	9	—
	University of Massachusetts, Amherst	Public	—	8	—
Mich.	Michigan State University, East Lansing	do	2	6	1
	University of Michigan, Ann Arbor	do	—	—	3
Minn.	University of Minnesota, Minneapolis	do	1	6	5
Miss.	University of Mississippi, University	do	3	—	—
Mo.	University of Missouri at Columbia, Columbia	do	4	11	1
Mont.	Montana State University, Bozeman	do	2	2	—
Nebr.	University of Nebraska, Lincoln	do	—	3	—
N.J.	Princeton University, Princeton	Private	1	—	—
	Rutgers, The State University, New Brunswick	Public	3	19	4
N.Y.	Columbia University, New York	Private	—	12	5
	Cornell University, Ithaca	do	—	4	—
	CUNY City College, New York	Public	18	11	—
	CUNY Hunter College, New York	do	1	—	—
	New York University, New York	Private	5	20	6
	SUNY State University of Buffalo, Buffalo	Public	—	3	—
	Syracuse University, Syracuse	Private	8	5	—
	University of Rochester, Rochester	do	—	9	—

See footnotes at end of table.

Table 70. LOCATION AND OWNERSHIP OF SCHOOLS CONFERRING DEGREES IN STATISTICS AND NUMBER OF GRADUATES: 1966-67—Continued

Location	School	Ownership	Graduates		
			Bachelor's degree	Master's degree	Doctor's degree
N.C.	North Carolina State University at Raleigh, Raleigh	Public	2	23	6
	University of North Carolina, Chapel Hill	do	—	2	7
Ohio	Bowling Green State University, Bowling Green	do	5	—	—
	Case Western Reserve University, Cleveland	Private	2	6	—
	University of Toledo, Toledo	Public	7	—	—
Okla.	University of Oklahoma, Norman	do	3	1	—
Oreg.	Oregon State University, Corvallis	do	—	6	—
Pa.	Carnegie-Mellon University, Pittsburgh	Private	—	1	1
	Lehigh University, Bethlehem	do	2	—	—
	Pennsylvania State University, University Park	Public	—	3	—
	Temple University, Philadelphia	Private	—	1	—
	University of Pennsylvania, Philadelphia	do	7	3	—
	Villanova University, Villanova	do	—	20	—
Tenn.	University of Tennessee, Knoxville	Public	6	4	—
Tex.	Southern Methodist University, Dallas	Private	9	10	—
	Texas A & M University, College Station	Public	—	13	4
	University of Texas, Austin	do	18	—	—
Utah	Utah State University, Logan	do	9	11	—
Va.	Hollins College, Hollins College	Private	1	—	—
	Virginia Polytechnic Institute, Blacksburg	Public	2	13	7
Wash.	University of Washington, Seattle	do	—	2	—
Wis.	University of Wisconsin, Madison	do	9	17	4
Wyo.	University of Wyoming, Laramie	do	12	4	—

Source: National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part B—Institutional Data, 1966–67*. OE–54013–67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968.

CHAPTER 14

Health Education

Health education is the process through which individuals acquire knowledge and behavior consistent with the achievement of optimum individual and community health. The practitioners of health education are public health educators and school health educators.

The *public health educator* or *community health educator* has a major interest in educating all segments of the community and is concerned with those forces which create or change behavior. His talents may also be directed toward planning and providing educational opportunities for other health personnel. The Society of Public Health Educators (485 members in 1968) estimates that since 1950 the number of public health educators has increased from about 600 to perhaps as many as 2,000 to 3,000 persons in 1968. Many of these persons are employed by State and local health departments and a small number, by the U.S. Public Health Service (tables 7 and 9, Introduction). The balance are employed by voluntary health agencies, health planning agencies, schools and colleges, hospitals and clinics, and industries.

The minimum educational requirement for public health educators is the baccalaureate degree in a program of public health education meeting standards of the Society of Public Health Educators. The American Public Health Association has recently accredited graduate level programs in community health education in schools of public health and other institutions of higher learning. Admission to these schools requires a bachelor's degree, preferably in health education, one of the social sciences, or an allied field. In the academic year 1968–69, 161 U.S. students received master's degrees in public health education (tables 71 and 72).

While the public health educator focuses his educational activities on the non-school community, the *school health educator* is mainly concerned with classroom teaching and other influences which the school exerts on health knowledge, behavior, attitudes and practices. Within a school system, he may coordinate the work of all groups in the community which are interested in the health of the school child and furnish leadership in developing and maintaining an adequate, well-balanced health program.

Since responsibility for health education programs in schools is often shared with other subject areas, it is difficult to identify all school health educators. The number employed in 1968 was approximately 18,000. The American Association for Health, Physical Education, and Recreation reports 6,000 members in 1968.

The school health educator must meet the regular certification standards for teachers in his State. He is required to have at least 4 years of college education leading to a bachelor's degree, with a background in the biological, physical, and social sciences as well as in the field of health education. A master's degree in the field of health education is being increasingly required. In 1968, 80 schools offered programs in health education (table 73).

In both school as well as community health education, increasing numbers of auxiliary personnel with lesser levels of preparation are performing health education tasks in settings appropriate to their skills.

Table 71. SCHOOLS OF PUBLIC HEALTH OFFERING PROGRAMS IN PUBLIC HEALTH EDUCATION, AND NUMBER OF GRADUATES: 1959-60 THROUGH 1968-69

Academic year	Number of schools	Graduates		Academic year	Number of schools	Graduates	
		Master's [1] degree	Doctor's [1] degree			Master's [1] degree	Doctor's [1] degree
1968–69	11	161	----	1963–64	9	92	3
1967–68	10	108	----	1962–63	9	80	5
1966–67	10	100	----	1961–62	9	69	6
1965–66	10	103	----	1960–61	6	86	2
1964–65	10	111	1	1959–60	6	74	1

[1] Includes foreign students.

Sources: U.S. Department of Health, Education, and Welfare, Public Health Service, Division of Medical Care Administration, Office of Health Education; and individual schools.

American Public Health Association for 1968–69 data.

Table 72. LOCATION AND OWNERSHIP OF SCHOOLS OF PUBLIC HEALTH OFFERING CURRICULA IN PUBLIC HEALTH EDUCATION AND NUMBERS OF STUDENTS SPECIALIZING IN PUBLIC HEALTH EDUCATION AWARDED MASTER'S DEGREES: 1968-69

Location	School	Ownership	Master's
	Total, 11 schools	----	[1]161
Calif.	Loma Linda University, Loma Linda	Private	14
	University of California, Berkeley	Public	30
	University of California, Los Angeles	do	18
Conn.	Yale University, New Haven	Private	8
Hawaii	University of Hawaii, Honolulu	Public	14
Mass.	Harvard University, Boston	Private	2
Mich.	University of Michigan, Ann Arbor	Public	17
Minn.	University of Minnesota, Minneapolis	do	7
N.Y.	Columbia University, New York	Private	2
N.C.	University of North Carolina, Chapel Hill	Public	24
P.R.	University of Puerto Rico, San Juan	do	25

[1] Includes 35 foreign students.

Source: The American Public Health Association, Inc.

Table 73. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING PROGRAMS OF SPECIALIZATION IN HEALTH EDUCATION AT UNDERGRADUATE AND GRADUATE LEVELS: 1968

Location	School	Ownership	Bachelor's degrees	Master's degrees	Doctor's degrees
	Total, 80 schools		60	58	27
Ariz.	Arizona State University, Tempe	Public	X	—	—
	University of Arizona, Tucson	do	X	X	—
Ark.	University of Arkansas, Fayetteville	do	—	X	—
Calif.	California State College, Long Beach	do	X	—	—
	California State College, Los Angeles	do	—	X	—
	Fresno State College, Fresno	do	X	X	—
	Sacramento State College, Sacramento	do	X	X	—
	San Diego State College, San Diego	do	X	X	—
	San Fernando Valley State College, Northridge	do	X	X	—
	San Francisco State College, San Francisco	do	X	—	—
	San Jose State College, San Jose	do	X	—	—
	Stanford University, Stanford	Private	—	X	X
	University of California, Los Angeles	Public	X	X	X
	University of the Pacific, Stockton	Private	—	X	--
	University of Southern California, Los Angeles	do	—	X	X
Colo.	Colorado State College, Greeley	Public	—	X	X
Conn.	University of Connecticut, Storrs	do	X	—	—
Fla.	Florida State University, Tallahassee	do	X	X	—
	University of Florida, Gainesville	do	X	—	—
Ill.	George Williams College, Downer's Grove	Private	—	X	—
	Northwestern University, Evanston	do	X	X	—
	Southern Illinois University, Carbondale	Public	X	X	X
	University of Illinois, Champaign	do	X	X	X
	Western Illinois University, Macomb	do	X	—	—
Ind.	Ball State University, Muncie	do	X	X	—
	Indiana State University, Terre Haute	do	X	X	—
	Indiana University, Bloomington	do	X	X	X
	Purdue University, Lafayette	do	X	X	X
Ky.	Eastern Kentucky University, Richmond	do	X	—	—
	Morehead State University, Morehead	do	X	—	—
	University of Kentucky, Lexington	do	X	—	—
La.	Louisiana State University, Baton Rouge	do	—	X	—
Md.	Morgan State College, Baltimore	do	X	—	—
	University of Maryland, College Park	do	X	X	X
Mass.	Boston University, Boston	Private	X	X	X
	Springfield College, Springfield	do	X	—	—
	State College at Lowell, Lowell	Public	X	—	—
	University of Massachusetts, Amherst	do	X	X	—
Mich.	Central Michigan University, Mount Pleasant	do	—	X	—
	Michigan State University, East Lansing	do	X	X	X
	University of Michigan, Ann Arbor	do	—	X	X
	Wayne State University, Detroit	do	—	X	—
Minn.	Mankato State College, Mankato	do	X	X	—
	University of Minnesota, Minneapolis	do	—	X	X
N.Y.	CUNY, Brooklyn College, Brooklyn	do	X	X	—
	CUNY Hunter College, New York	do	—	X	—
	Columbia University, Teachers College, New York	Private	—	X	X
	New York University, New York	do	X	X	X
	SUNY at Brockport, Brockport	Public	—	X	—
	SUNY at Cortland, Cortland	do	X	X	—
	SUNY at Buffalo, Buffalo	do	—	X	X
	Syracuse University, Syracuse	Private	X	X	X

Table 73. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING PROGRAMS OF SPECIALIZATION IN HEALTH EDUCATION AT UNDERGRADUATE AND GRADUATE LEVELS: 1968—Continued

Location	School	Ownership	Bachelor's degrees	Master's degrees	Doctor's degrees
N.J.	Trenton State College, Trenton	Public	X	X	—
N.C.	North Carolina College, Durham	do	X	—	—
	University of North Carolina, Chapel Hill	do	X	X	X
	University of North Carolina, Greensboro	do	X	X	—
Ohio	Kent State University, Kent	do	X	X	—
	Miami University, Oxford	do	X	—	—
	Ohio State University, Columbus	do	X	X	X
	University of Cincinnati, Cincinnati	do	X	—	—
	University of Toledo, Toledo	do	X	X	X
Oreg.	Oregon State University, Corvallis	do	X	X	X
	Portland State College, Portland	do	X	—	—
	University of Oregon, Eugene	do	X	X	X
Pa.	Temple University, Philadelphia	Private	—	X	X
Tenn.	East Tennessee State University, Johnson City	Public	X	X	—
	University of Tennessee, Knoxville	do	X	X	—
Tex.	North Texas State University, Denton	do	X	—	—
	Sam Houston State College, Huntsville	do	X	X	—
	Texas Southern University, Houston	do	X	X	—
	Texas Woman's University, Denton	do	—	X	X
	University of Texas, Austin	do	X	X	X
Utah	Brigham Young University, Provo	Private	X	X	—
	University of Utah, Salt Lake City	Public	X	X	—
	Utah State University, Logan	do	X	—	—
Va.	Madison College, Harrisonburg	do	X	—	—
Wash.	University of Washington, Seattle	do	X	—	—
W. Va.	West Virginia State College, Institute	do	X	—	—
	West Virginia University, Morgantown	do	—	X	X
Wis.	University of Wisconsin, Madison	do	—	X	X

Source: *Institutions Offering Programs of Specialization in Health Education*. School Health Education Study: Washington, D.C. December 1967. Updated to 1968.

CHAPTER 15

Health Information and Communication

The importance of making authoritative health information available to the public in an understandable and appealing form is reflected in the increasing numbers of writers and graphic arts specialists employed by health organizations. Some of these staff members are also involved with making professional, scientific, and technical information accessible to the health specialists themselves.

Among the occupations concerned with health communications are (a) information specialists and science writers, (b) technical writers, (c) medical illustrators and (d) illustrators, poster and display artists, and draftsmen. The numbers employed in the health field in 1968 probably exceeded 4,500 and may have been considerably higher.

Information Specialist and Science Writer

The National Association of Science Writers, Inc., (887 members in 1969) estimates that between 2,000 and 3,000 persons were employed in 1968 as health information specialists or science writers. The distinction between persons in these two careers depends primarily on the place of their employment and the duties performed.

The *science writer* is a journalist who specializes in health or other scientific subjects. He writes for newspapers, magazines, radio, television, or for scientific or professional publications to acquaint the public with developments in the fields of science, including medicine. Science writers are employed by newspapers, serve as editors or writers on magazines and in publishing houses, or have staff positions as information specialists in scientific and health organizations. A substantial proportion are free-lance writers, working on their own time.

The *health information specialist* is employed by large health organizations to inform the public of achievements as well as programs of the organization. To accomplish this, he makes use of leaflets and other publications, newspapers, magazines, radio, television, exhibits, and motion pictures.

The minimum education requirement for a communication specialist is a bachelor's degree usually in English or journalism with some supplementary science courses.

Technical Writer

The technical writer and the science writer deal with the same general subject matter, but each focuses mainly on a particular group of readers. The technical writer's specialty is writing about scientific and technical developments primarily for professional persons in the field. Since the material is written for this group and is technical in nature, the emphasis is on specifics written in great detail.

Some technical writers specializing in the health sciences work for universities, foundations, Federal agencies, and other organizations with research programs. Others are employed by professional societies, scientific and medical publishers, manufacturers, and other businesses with health-related interests. A few also work on free-lance assignments.

Well over 30,000 *technical writers* and *editors* were employed in 1967. Approximately 20 percent of these persons were active in the biomedical sciences. Very few of the 4,800 members of the Society of Technical Writers and Publishers, Inc., in 1968 are known to be in the health field. The American Medical Writers Association (1,700 members) estimate that most of their members are employed in the health field.

Medical Illustrator

An estimated 500 to 600 persons were employed as *medical illustrators* in 1968 according to the Association of Medical Illustrators (214 active

members). Medical illustrators, including medical photographers, work with physicians, research scientists, medical educators, authors, and others to graphically record facts and progress in the health field. They serve a vital role in the communication of scientific information through publications, exhibits, television, and other media.

For the most part, medical artists work for hospitals, clinics, medical schools, public and private research institutes, large pharmaceutical firms, and medical publishing houses. Medical illustrators may also free-lance, and some combine free-lancing with a part-time salaried position in a hospital or other medical institution.

Five medical facilities offer courses in medical illustration of not less than 20 months or 2 academic years (table 74). The entrance requirements include 3 to 5 years of college with extensive course work in the biological sciences, art, and other related subjects. A total of 52 students were enrolled in 1968, to be graduated over a 3-year period.

Illustrator, Poster and Display Artist, and Draftsman

Illustrators, poster and display artists, and *draftsmen* have been drawn into health activities by the increasing emphasis on providing information to the public. Unlike medical art, this kind of work does not require special scientific training for functioning in the health field. The technical skill of a commercial artist is needed plus a flair for putting abstract ideas into visual form. Training in this field is usually acquired from technical institutes, colleges offering special 2-year programs, vocational and technical high schools, and correspondence schools. Training may also be obtained through apprenticeship programs or on-the-job programs.

Technicians in visual presentation are employed by health departments in cities, counties, States, and the Federal Government. Some also work for large voluntary health agencies. No information is available on the number of draftsmen in the health field, and there is no association that represents them.

Table 74. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING COURSES IN MEDICAL ILLUSTRATION: 1968

Location	School	Ownership	Curricula offered	
			Bachelor's degree	Master's degree
	Total, 5 schools		2	4
Ga.	Medical College of Georgia, Department of Art as Applied to Medicine, Augusta.	Public	x	x
Ill.	University of Illinois College of Medicine, Department of Medical and Dental Illustration, Chicago.	Public	x	
Md.	Johns Hopkins University School of Medicine, Department of Art as Applied to Medicine, Baltimore.	Private		x
Mich.	University of Michigan Medical School, Medical and Biological Illustration, Ann Arbor.	Public		x
Tex.	University of Texas Southwestern Medical School, Department of Medical Art and Visual Education, Dallas	Public		x

Source: Association of Medical Illustrators.

CHAPTER 16

Library Services in the Health Field

Library services in the health field are designed to meet the needs of professional staff and personnel—medical, scientific, administrative and others; the needs of professional schools—medical, dental, nursing, and other disciplines; and the needs of hospital patients. The kinds of library services offered vary with the function and size of the institution.

Medical libraries vary in size. The greatest number are in the 20,000 to 75,000 volume range. These libraries have as their function the acquisition, indexing, cataloguing, classification, storage, and dissemination of medical knowledge. The primary purpose of these libraries is to assist in education, research, communication of health information, and the improvement of health practices.

Estimates indicate that medical libraries are located in about 3,200 hospitals; 1,100 schools and colleges of medicine, dentistry, nursing, pharmacy, and other health disciplines; 1,100 research and industrial institutions; and 1,000 Federal Government installations (*32*). Of the estimated 6,400 medical libraries, probably only three out of four have a staff employed either full or part time.

Medical Librarian

In this chapter, *medical librarians* are designated as those who provide library services to meet the needs of professional staff and of professional schools. They may also be responsible for the needs of hospital patients, but librarians concerned only with patients are designated as patients' librarians. Medical record services are described in chapter 17 and should not be confused with library services.

Medical librarians sometimes called *health science librarians* are employed in health care institutions, departments of public health, pharmaceutical firms, insurance companies, and general biomedical research institutions. They work with physicians and other health and research workers, as well as with students and instructors preparing for careers in health fields.

Estimates developed by the National Library of Medicine show that probably 9,000 persons were employed in 1968 to staff the specialized health-related libraries in the United States, with fewer than 3,000 of these persons professionally trained as differentiated from clerical staff. It is estimated that about 1,000 are trained medical librarians, of whom 764 have met the requirements for certification by the Medical Library Association.

A comprehensive nationwide survey of health science library manpower has been sponsored by the National Library of Medicine in conjunction with the Medical Library Association. Preliminary findings should be available early in 1970.

The Medical Library Association reports 1,550 member librarians; the Association of Hospital and Institution Libraries of the American Library Association has 900 member librarians.

Of the 41 accredited U.S. schools which offer a master's degree in library science, 15 offer special courses in medical bibliography, and, of these, five offer graduate programs in medical librarianship (table 75).

The basic requirement for certification as a medical librarian is an undergraduate degree plus a master's degree from an accredited school of library science offering an approved course in medical bibliography. This 5-year program may be followed by an internship or other specialized training.

Several associations or organizations conduct short-term (1 week or less) courses for individuals without formal education in library science but having responsibility for library service in hospitals. Sponsors of this type of training activity include the American Hospital Association and the Catholic Hospital Association.

In addition to librarians and clerical staff, medical libraries may employ other personnel such as indexers, abstractors, translators, and specialists trained in the uses of automatic data processing in the storage and retrieval of information. No employment statistics are available on these occupations.

Patients' Librarian

Differentiated from the medical library is the patients' library which is designed to meet the reading needs of individual patients in the hospital. An estimate of the number of hospitals that have a separately administered patients' library staffed by hospital employees is not available. Often volunteers are responsible for whatever service is available to patients. A small number of patients' libraries, however, are professionally staffed either with a full-time or part-time librarian. In many instances the city or county public library or the State library agency has librarians on its staff who supply library services to hospital patients.

The patients' librarian, sometimes known as the *hospital librarian*, develops library facilities to meet the interest of bed-ridden and ambulatory patients, provides book cart service, and encourages reading as a part of the therapeutic program for hospitalized persons.

To qualify as a professional librarian, one must ordinarily have completed 4 years of undergraduate study for a bachelor's degree, plus a fifth year of graduate study in library science for a master's degree.

In 1969, 41 schools conferring the master's degree in library science were accredited by the American Library Association. Other colleges and universities offer courses within their 4 year undergraduate programs as well as at the graduate level which prepare students for some types of library work.

REFERENCE

(32) The President's Commission on Heart Disease, Cancer, and Stroke: A *National Program to Conquer Heart Disease, Cancer, and Stroke:* A *Program for Developing Medical Libraries.* II: 380–399. Washington. U.S. Government Printing Office, February 1965.

Table 75. LOCATION AND OWNERSHIP OF SCHOOLS OF LIBRARY SCIENCE THAT OFFER SPECIAL COURSES IN MEDICAL BIBLIOGRAPHY: 1969

Location	School	Ownership
	Total, 15 schools [1]	
Calif.	University of California, Los Angeles [2]	Public.
	University of Southern California, Los Angeles	Private.
D.C.	Catholic University of America, Washington	do.
Ga.	Emory University, Atlanta	do.
Ill.	University of Chicago, Chicago [2]	do.
	University of Illinois, Urbana [2]	Public.
Md.	University of Maryland, College Park	do.
Mich.	University of Michigan, Ann Arbor	do.
Minn.	University of Minnesota, Minneapolis [2]	do.
N.Y.	Columbia University, New York	Private.
N.C.	University of North Carolina, Chapel Hill	Public.
Ohio	Case Western Reserve University, Cleveland [2]	Private.
Okla.	University of Oklahoma, Norman	Public.
Pa.	Drexel Institute of Technology, Philadelphia	Private.
	University of Pittsburgh, Pittsburgh	Public.

[1] Data not available on number of students enrolled in these courses. [2] Offer a graduate degree program in medical librarianship.

Source: U.S. Department of Health, Education, and Welfare, National Library of Medicine.

CHAPTER 17

Medical Records

A medical record in a hospital or clinic is a permanent document of the history and condition of a patient's illness or injury. It is a complete compilation of medical observations and findings from the time a patient is admitted until his discharge. In 1968, almost 38,500 medical record librarians and technical and clerical workers were employed in the medical record departments of hospitals, clinics, health departments and agencies, or industrial establishments (table 76).

Medical record librarians are responsible for the designing of health information systems; planning, organizing, directing, and controlling medical record services; developing, analyzing and evaluating medical records and indexes; cooperating with the medical staff in developing methods for evaluation of patient care; and cooperating with the medical and administrative staff in research projects utilizing health care information. Their duties vary greatly with the type and size of the institution where they are employed. In a small hospital additional duties may consist of serving as admitting officer or as bookkeeper or secretary to the administrator and medical staff. In a large hospital their time may be devoted primarily to planning medical record procedures and services, supervising department staff members, or the educational and research programs of the hospital.

The minimum educational requirement for professional registration as a medical record librarian is 2 years of general college work and 1 year of study in medical record science in a school approved by the American Medical Association.

Beginning in 1970, all approved schools for medical record librarians will be at the baccalaureate level and above, either incorporated into a 4-year program leading to a baccalaureate degree, or in a program of post-baccalaureate study. In 1968, 27 schools graduated 191 medical record librarians (tables 77 and 78).

The American Association of Medical Record Librarians (AAMRL) maintains a list of persons who have successfully completed the national registration examination which qualifies them to use the professional designation of Registered Record Librarian (RRL). Since 1932, a total of 6,196 such persons have been registered. An estimated 3,900 RRL's were active in the profession in 1968.

The *medical record technician* assists the medical record librarian and performs the technical tasks associated with the maintenance and use of medical records. Formal training for medical record technicians was started in 1953 in AMA–AAMRL approved hospital schools and junior colleges. Associate degree programs in junior colleges require 2 years of study, and hospital based programs—9 to 12 months. Practical instruction is given in medical terminology, anatomy, physiology and medical record procedures. A total of 118 medical record technicians were graduated from the 16 approved schools in 1967–68 (tables 79 and 80).

The correspondence course of the AAMRL—open to persons who are employed in medical record work and who are high school graduates—is another avenue to becoming a medical record technician. Those who satisfactorily complete the 25-lesson course are eligible to apply for the national accreditation examination. On successful completion of the examination the candidate is classified as an ART-accredited record technician.

Since 1955, a total of 2,761 persons have successfully completed the qualifying examination to become ART's—about 1,000 within the past 2 years. About 2,000 ART's were employed in 1968 (table 76).

Table 76. ESTIMATED NUMBER OF ACTIVE MEDICAL RECORD PERSONNEL: SELECTED YEARS 1950 THROUGH 1968

Year	Total	Medical record librarians		Other medical record personnel	
		Total	Registered record librarians (RRL's)	Total	Accredited record technicians (ART's)
1968	38,500	[1] 12,500	3,900	26,000	2,000
1967	37,000	[1] 12,000	3,800	25,000	1,500
1965	33,000	10,000	3,500	23,000	800
1960	28,000	8,000	3,000	20,000	300
1955	22,000	7,000	2,500	15,000	----------
1950	12,000	4,000	2,000	8,000	----------

[1] Includes about 2,000 employed outside of hospitals—in clinics, health departments and agencies, or industrial establishments.

Source: American Association of Medical Record Librarians and National Center for Health Statistics.

Table 77. SCHOOLS OFFERING APPROVED PROGRAMS FOR MEDICAL RECORD LIBRARIANS, STUDENTS, AND GRADUATES: SELECTED YEARS, 1949-50 THROUGH 1967-68

Academic year	Schools	Students [1]	Graduates [2]	Academic year	Schools	Students [1]	Graduates [2]
1967–68	27	214	191	1961–62	27	168	152
1966–67	28	211	192	1960–61	28	146	139
1965–66	28	214	192	1959–60	29	144	137
1964–65	29	199	180	1954–55	21	145	137
1963–64	27	174	161	1949–50	18	90	83
1962–63	28	150	142				

[1] Enrollment in final year only.

[2] Includes graduates receiving certificates (less than college level), bachelor's degrees, and master's degree through August of year concerned.

Sources: American Association of Medical Record Librarians and Council of Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues. Data for United States and Puerto Rico.

Table 78. LOCATION AND OWNERSHIP OF APPROVED SCHOOLS FOR MEDICAL RECORD LIBRARIANS AND NUMBER OF STUDENTS AND GRADUATES: 1967-68

Location	School	Ownership	Students [1]	Graduates [2]		
				Certificate	Bachelor's	Master's
	Total, 27 schools		214	30	160	1
Calif.	Loma Linda University, Loma Linda	Private	18	—	16	—
	University of California, Los Angeles	Public	12	—	5	—
D.C.	George Washington University, Washington	Private	1	—	—	1
Ga.	Emory University-Emory University Hospital, Atlanta.	do.	7	—	[3]5	—
	Medical College of Georgia-Eugene Talmadge Memorial Hospital, Augusta.	Public	7	—	7	—
Ill.	University of Illinois College of Medicine, Chicago.	do.	15	—	14	—
Ind.	Indiana University School of Medicine, Indianapolis.	do.	7	—	7	—
La.	University of Southwestern Louisiana, Lafayette Charity Hospital.	do.	15	—	15	—
Md.	U.S. Public Health Service Hospital, Baltimore	do.	11	—	[3]10	—
Mass.	Northeastern University, Boston	Private	1	—	1	—
Mich.	Mercy College, Detroit	do.	6	—	6	—
Minn.	College of St. Scholastica, Duluth	do.	16	—	16	—
Miss.	University Hospital, Jackson	Public	6	3	—	—
Mo.	Avila College, Kansas City	Private	1	—	1	—
	Homer G. Phillips Hospital, St. Louis	Public	5	5	—	—
	St. Louis University, St. Louis	Private	5	—	4	—
Nebr.	College of Saint Mary, Omaha	do.	8	—	8	—
N.Y.	Roswell Park Memorial Institute-Rosary Hill College, D'Youville College, Buffalo.	Public	5	—	3	—
N. C.	North Carolina Baptist Hospitals, Winston-Salem.	do.	11	11	—	—
Okla.	Hillcrest Medical Center, Tulsa	do.	8	8	—	—
Pa.	Mount Mercy College—Mercy Hospital, Pittsburgh.	do.	4	—	4	—
Tenn.	Baptist Memorial Hospital, Memphis	do.	5	3	—	—
Tex.	Sacred Heart Dominican College—St. Joseph's Hospital, Houston.	do.	8	—	6	—
	Incarnate Word College—Santa Rosa Medical Center, San Antonio.	do.	6	—	6	—
Wash.	Seattle University—Providence Hospital, Seattle.	do.	14	—	14	—
Wis.	Viterbo College—St. Francis Hospital, La Crosse.	do.	6	—	6	—
P. R.	University of Puerto Rico School of Medicine, San Juan.	do.	6	—	[3]6	—

[1] Enrollment in final year only.

[2] Number of graduates who received a certificate in medical record science (less than collegiate level), a bachelor's degree, or a master's degree.

[3] Requirement of a bachelor's degree for entrance into program.

Source: American Association of Medical Record Librarians.

Table 79. SCHOOLS OFFERING APPROVED PROGRAMS FOR MEDICAL RECORD TECHNICIANS, STUDENTS, AND GRADUATES: SELECTED YEARS, 1954-55 THROUGH 1967-68

Academic year	Schools	Students	Graduates	Academic year	Schools	Students	Graduates
1967–68	16	130	118	1962–63	14	95	81
1966–67	12	118	93	1961–62	12	74	72
1965–66	15	115	105	1960–61	12	48	47
1964–65	13	77	70	1959–60	12	46	46
1963–64	14	130	98	1954–55	8	35	28

Sources: American Association of Medical Record Librarians and Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.

Table 80. LOCATION AND OWNERSHIP OF APPROVED SCHOOLS FOR MEDICAL RECORD TECHNICIANS AND NUMBER OF STUDENTS AND GRADUATES: 1967-68

Location	Schools	Ownership	Students	Graduates
	Total, 16 schools		130	118
Ariz	Phoenix College, Phoenix	Public	13	13
	Tucson Medical Center, Tucson—Cochise Junior College	Private	6	6
Calif	East Los Angeles College, Los Angeles	Public	9	5
	Fullerton Junior College, Fullerton	do	8	5
Kans	Hutchinson Community Junior College, Hutchinson	do	5	5
Md	Community College of Baltimore, Baltimore	do	6	6
Mass	St. Joseph's Hospital, Lowell	Private	9	8
	Children's Hospital Medical Center, Boston	do	6	6
Minn	St. Mary's Junior College, Minneapolis	do	7	7
Mo	Research Hospital and Medical Center, Kansas City	do	24	23
Ohio	Marymount Hospital, Garfield Heights [1]	do	—	—
Tenn	Madison Hospital, Madison—Southern Missionary College	do	2	2
Tex	Hendrick Memorial Hospital, Abilene	do	8	8
Wash	Spokane Community College, Spokane	Public	18	15
	St. Joseph Hospital, Tacoma-Tacoma Community College	Private	5	5
	Shoreline Community College, Seattle	Public	4	4

[1] Did not admit students for academic year 1967–68.

Source: American Association of Medical Record Librarians.

CHAPTER 18

Medicine and Osteopathy

The science and art of dealing with the prevention, cure, and alleviation of disease is the province of both doctors of medicine and doctors of osteopathy. As of December 31, 1967, there were 322,045 such physicians in the United States and outlying areas of whom 308,630 had the degree of Doctor of Medicine (M.D.) and 13,415 had the degree, Doctor of Osteopathy (D.O.). Both kinds of physicians diagnose diseases, treat people who are ill, and, in most States, use surgery, drugs, and all other accepted methods of medical care.

Active physicians numbered 305,453 in 1967, of whom 27,724 were Federal physicians and 277,729 were non-Federal. The number of both active and inactive non-Federal physicians, was 292,661 (excluding 1,660 with addresses unknown and 2,513 temporarily in foreign locations). Of this number, 290,420 were located in the 50 States and the District of Columbia; 2,038 in Puerto Rico; and 203 in other U.S. outlying areas (American Samoa, Canal Zone, Guam, Pacific Islands, and the Virgin Islands).

The number of M.D.'s and D.O.'s per 100,000 total population remained relatively constant at 149 from 1950 through 1963 and increased to 158 by 1967. The ratio of non-Federal physicians providing patient care in solo, partnership, group or other office-based practice per 100,000 civilian population has remained consistent at 100 over the last few years (table 81).

The number of active physicians (M.D.'s and D.O.'s) in solo, partnership, group or other practice has increased by about 11,000 since 1963 (table 82). The percentage, however, of all active physicians in solo, partnership, group or other practice has decreased by 3 percent since 1963 (table 83).

In general, the northeastern States have the highest ratios of physicians to population; the southern States, the lowest. Table 84 indicates for each State the ratio of active physicians to the resident population. The ratios of all non-Federal physicians and those providing patient care per 100,000 civilian population in 1967 are shown for each State in table 85. The number of active non-Federal physicians providing patient care by type of practice in 1967 for each State is shown in table 86.

Specialists outnumber general practitioners greater than two to one among the total active physicians (table 87). Of the 305,453 active physicians in practice in 1967, 212,195 indicated a primary specialty other than general practice. Approximately half of these specialists held certificates awarded by American Specialty Boards. Nineteen specialty certifying boards are affiliated with the AMA, and 12 with the American Osteopathic Association (AOA) (*33*).

A license to practice is required in all States and the District of Columbia. To qualify for a license, a candidate must be a graduate of an approved school, pass a licensing examination, and—in more than half the States—serve a 1-year hospital internship.

In 1967–68, there were 103 medical schools in the United States and Puerto Rico, including 85 approved medical schools that award the M.D. degree, 2 approved schools of basic medical sciences from which students may transfer to one of the 85 degree-granting schools, and 6 medical schools recently established. In addition, there are five osteopathic colleges that award the D.O. degree to those completing the 4-year course. In 1967–68, the 100 M.D. and D.O. schools enrolled 36,368 students and graduated 8,400 physicians (tables 88 and 89).

Training as a physician usually takes 7 years after graduation from high school, and often includes an additional number of years of training. Three years of college work is the usual minimum requirement for entry into schools of medicine and osteopathy, but 4 years is preferable. This is followed by 4 years of study leading to the M.D. or D.O. degree. After graduation, almost all doctors serve a 12-month internship in an approved hospital. Those who wish to become certified specialists must have 2 to 4 years of advanced hospital training (residency), followed

by 2 or more years of supervised practice in the specialty.

Many graduates of foreign medical schools serve as interns and residents in this country. These foreign graduates—citizens of foreign countries as well as U.S. citizens—account for 31 percent of all physicians in training programs (*34*). To be appointed to approved internships or residencies in U.S. hospitals, these graduates must pass the American Qualification Examination given by the Educational Council for Foreign Medical Graduates.

The supply of physicians is presently augmented by foreign medical graduates, some who become fully licensed to enter practice, and some who remain without licenses (*35*). As of December 31, 1968, there were approximately 46,350 foreign medical graduates and an additional 6,600 Canadian medical school graduates in the United States (*36*).

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(*34*) Council on Medical Education: Education Number of the *J.A.M.A.* 206(9): 2043. Chicago. American Medical Association, November 1968. Also prior annual issues.

(*35*) *Report of the National Advisory Commission on Health Manpower,* Vol. I. U. S. Government Printing Office, November 1967.

(*36*) Department of Survey Research: *Medical School Alumni.* Chicago. American Medical Association. 1968. p. 9.

Table 31. PHYSICIANS IN RELATION TO POPULATION: SELECTED YEARS, 1950 THROUGH 1967

Year [1]	Population in thousands	Number of physicians			Physicians per 100,000 population
		M.D. and D.O.	M.D.	D.C.	
	Total [2]	All physicians, active and inactive [3]			
1967	203,704	322,045	308,630	13,415	158
1966	201,585	313,559	300,375	13,184	156
1965	199,278	305,115	292,088	13,027	153
1964	196,858	297,089	284,224	12,865	151
1963	194,169	289,188	276,475	12,713	149
1960	185,370	274,833	260,484	14,349	148
1955	170,499	255,211	241,711	13,500	150
1950	156,472	232,697	219,997	12,700	149
	Total	All Federal and active non-Federal physicians [4]			
1967	203,704	305,453	294,072	11,381	150
1966	201,585	297,097	285,857	11,240	147
1965	199,278	288,671	277,575	11,096	145
1964	196,858	280,461	269,552	10,909	142
1963	194,169	272,500	261,728	10,772	140
1960	185,370	259,420	247,257	12,163	140
1955	170,499	240,153	228,553	11,600	141
1950	156,472	219,897	208,997	10,900	141

See footnotes at end of table.

Table 81. PHYSICIANS IN RELATION TO POPULATION: SELECTED YEARS, 1950 THROUGH 1967—Continued

Year [1]	Population in thousands	Number of physicians			Physicians per 100,000 population
		M.D. and D.O.	M.D.	D.O.	
	Civilians	Non-Federal physicians providing patient care [5]			
1967	199,783	260,296	249,273	11,023	130
1966	197,662	254,396	243,333	11,063	129
1965	195,833	250,208	239,262	10,946	128
1964	193,612	244,542	233,772	10,770	126
1963	190,892	237,673	227,027	10,646	125
	Civilians	Non-Federal physicians providing patient care in office-based practice [6]			
1967	199,783	200,146	190,079	10,067	100
1966	197,662	197,214	187,100	10,114	100
1965	195,833	195,334	185,338	9,996	100
1964	193,612	192,978	183,076	9,902	100
1963	190,892	189,267	179,449	9,818	99
1960	182,349	179,177	168,142	11,035	98
1955	167,038	169,871	159,371	10,500	102
1950	153,635	158,089	158,189	9,900	109

[1] All data as of December 31.

[2] Includes civilians in 50 States, District of Columbia, Puerto Rico, and other U.S. outlying areas; U.S. citizens in foreign countries; and the Armed Forces in United States and abroad.

[3] Includes non-Federal physicians in the 50 States, District of Columbia, Puerto Rico, and other U.S. outlying areas (American Samoa, Canal Zone, Guam, Pacific Islands, and Virgin Islands); those with addresses temporarily unknown to the AMA; and Federal physicians in the United States and abroad. Excludes physicians with temporary foreign addresses.

[4] Excludes physicians with addresses temporarily unknown to the AMA and those whose status was not reported to the AOA.

[5] Includes those in solo, partnership, group, or other forms of office practice and those in hospital-based practice—interns, residents, fellows, and full-time hospital staff.

[6] Data for 1963–67 are for M.D.'s in solo, partnership, group, or other practice and D.O.'s in private practice. Prior to 1963 data refer to M.D.'s and D.O.'s in private practice.

Sources: AMA Department of Survey Research: *Distribution of Physicians, Hospitals, and Hospital Beds in the U.S., 1967. Regional, State, County, Metropolitan Areas.* J. N. Haug and G. A. Roback. Chicago.

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Table 82. PHYSICIANS BY TYPE OF PRACTICE: 1963-67 [1]

Type of practice	1963	1964	1965	1966	1967
All physicians	289,188	297,089	305,115	313,559	322,045
Active physicians [2]	272,500	280,461	288,671	297,097	305,453
Doctors of Medicine	276,475	284,224	292,088	300,375	308,630
Non-Federal	253,226	261,048	268,040	272,891	279,418
Patient care [3]	227,027	233,772	239,262	243,333	249,273
Solo, partnership, group or other practice [4]	179,449	183,076	185,338	187,100	190,079
General practice [5]	69,041	67,583	66,377	64,776	63,543
Other full-time primary specialty	110,408	115,493	118,961	122,324	126,536
Hospital-based practice	47,578	50,696	53,924	56,233	59,194
Training programs [6]	35,153	37,473	39,604	40,709	42,590
Full-time hospital staff	12,425	13,223	14,320	15,524	16,604
Other professional activity [7]	12,787	13,937	15,499	16,346	17,247
Inactive	13,412	13,339	13,279	13,212	12,898
Federal	21,914	21,843	22,814	26,178	27,552
Patient care [8]	19,924	19,771	20,156	23,433	24,917
Training programs [6]	3,363	3,535	3,902	4,228	4,266
Full-time hospital staff	16,561	16,236	16,254	19,205	20,651
Other professional activity [7]	1,990	2,072	2,658	2,745	2,635
Address unknown	1,335	1,333	1,234	1,306	1,660
Doctors of Osteopathy	12,713	12,865	13,027	13,184	13,415
Non-Federal	12,702	12,849	13,005	13,155	13,243
Patient care [3]	10,646	10,770	10,946	11,063	11,023
Private practice	9,818	9,902	9,996	10,114	10,067
General practice [8]	8,699	8,704	8,730	8,766	8,651
Other full-time primary specialty	1,119	1,198	1,266	1,348	1,416
Hospital-based practice	828	868	950	949	956
Training programs [6]	655	687	768	755	775
Full-time hospital staff	173	181	182	194	181
Other professional activity [7]	115	123	128	148	186
Inactive	1,188	1,211	1,232	1,263	1,300
Status not reported	753	745	699	681	734
Federal	11	16	22	29	172

[1] Includes non-Federal physicians in the 50 States, District of Columbia, Puerto Rico, and other U.S. outlying areas (American Samoa, Canal Zone, Guam, Pacific Islands, and Virgin Islands); those with addresses temporarily unknown to the American Medical Association; and Federal physicians in the United States and abroad. Excludes physicians with temporary foreign addresses.

[2] Excludes the categories inactive, address unknown, and status not reported.

[3] M.D.'s include those in solo, partnership, group or other practice and those in hospital-based practice; D.O.'s include those in private practice, and those in hospital-based practice.

[4] Includes M.D.'s providing patient care in private practice and institutional settings such as industry, insurance companies, health departments, laboratories, etc.

[5] Includes no specialty and other specialties not recognized.

[6] Includes interns, residents, and fellows.

[7] Includes teaching, administration, and research.

[8] Includes manipulative therapy.

Sources: AMA Department of Survey Research: *Distribution of Physicians, Hospitals, and Hospital Beds in the U.S., 1967: Regional, State, County, Metropolitan Area.* J. N. Haug and G. A. Roback. Chicago. American Medical Association, 1968. Also, prior annual reports.

AOA Membership and Statistics Department: *A Statistical Study of the Osteopathic Profession, December 31, 1967.* Chicago. American Osteopathic Association, June 1968. Also, prior annual reports.

Table 83. PERCENT OF ACTIVE PHYSICIANS BY TYPE OF PRACTICE: 1963-67

Type of practice	1963	1964	1965	1966	1967
Number, all active physicians	272,500	280,461	288,671	297.097	305,453
	Percent, all active physicians				
Non-Federal	92	92	92	91	91
Solo, partnership, group or other practice [1]	69	69	68	66	66
General practice	28	27	26	25	24
Other full-time primary specialty	41	42	42	41	42
Hospital-based practice	18	18	19	19	19
Training programs	13	13	14	14	14
Full-time hospital staff	5	5	5	5	5
Other professional activity	5	5	5	6	6
Federal	8	8	8	9	9

[1] Data are for M.D.'s in solo, partnership, group or other practice, and D.O.'s in private practice.

Source: Table 82.

Table 84. LOCATION OF FEDERAL AND ACTIVE NON-FEDERAL PHYSICIANS (M.D. AND D.O.) IN RELATION TO POPULATION: DECEMBER 31, 1967

Location	Population in thousands	All active physicians			All active physicians per 100,000 population
		Total	Federal	Non-Federal	
All locations	[1] 203,704	305,453	[3] 27,724	277,729	150
United States	[2] 197,863	299,724	24,187	275,537	151
Alabama	3,533	3,076	308	2,768	87
Alaska	271	257	87	170	95
Arizona	1,637	2,397	310	2,087	146
Arkansas	1,972	1,783	183	1,600	90
California	18,992	35,175	3,101	32,074	185
Colorado	2,012	3,919	427	3,492	195
Connecticut	2,918	5,457	275	5,182	187
Delaware	524	748	51	697	143
District of Columbia	808	3,896	993	2,903	482
Florida	6,035	8,700	877	7,823	144
Georgia	4,490	5,009	629	4,380	112
Hawaii	760	1,007	57	950	133
Idaho	701	678	44	634	97
Illinois	10,887	15,374	959	14,415	141
Indiana	5,012	5,128	176	4,952	102
Iowa	2,772	3,266	146	3,120	118
Kansas	2,281	2,845	297	2,548	125
Kentucky	3,201	3,334	294	3,040	104

See footnotes at end of table.

Table 84. LOCATION OF FEDERAL AND ACTIVE NON-FEDERAL PHYSICIANS (M.D. AND D.O.) IN RELATION TO POPULATION: DECEMBER 31, 1967—Continued

Location	Population in thousands	All active physicians			All active physicians per 100,000 population
		Total	Federal	Non-Federal	
Louisiana	3,663	4,377	425	3,952	119
Maine	982	1,218	96	1,122	124
Maryland	3,680	8,265	2,157	6,108	225
Massachusetts	5,434	11,416	730	10,686	210
Michigan	8,608	12,541	421	12,120	146
Minnesota	3,625	5,510	324	5,186	152
Mississippi	2,344	1,918	230	1,688	82
Missouri	4,587	6,756	302	6,454	147
Montana	699	766	82	684	110
Nebraska	1,443	1,768	140	1,628	123
Nevada	436	489	43	446	112
New Hampshire	691	925	60	865	134
New Jersey	6,981	10,114	504	9,610	145
New Mexico	1,002	1,203	233	970	120
New York	18,023	41,091	1,786	39,305	228
North Carolina	5,059	5,391	433	4,958	107
North Dakota	632	653	90	563	103
Ohio	10,488	14,811	571	14,240	141
Oklahoma	2,516	3,038	290	2,748	121
Oregon	1,981	2,885	143	2,742	146
Pennsylvania	11,672	18,808	868	17,940	161
Rhode Island	901	1,513	151	1,362	168
South Carolina	2,638	2,375	371	2,004	90
South Dakota	668	631	93	538	94
Tennessee	3,936	4,687	358	4,329	119
Texas	10,858	14,017	2,017	12,000	129
Utah	1,022	1,406	90	1,316	138
Vermont	420	729	21	708	174
Virginia	4,541	5,920	1,004	4,916	130
Washington	3,208	4,964	529	4,435	155
West Virginia	1,807	1,907	124	1,783	106
Wisconsin	4,194	5,243	249	4,994	125
Wyoming	319	340	38	302	107
Puerto Rico	2,695	2,124	124	2,000	79
U.S. outlying areas	327	279	87	192	85

[1] Includes civilians in 50 States, District of Columbia, Puerto Rico, and other U.S. outlying areas, U.S. citizens in foreign countries, and the Armed Forces in United States and abroad as of January 1, 1968.

[2] Resident population as of July 1, 1967.

[3] Includes 3,326 Federal physicians overseas not distributed by location.

Sources: AMA Department of Survey Research: *Distribution of Physicians, Hospitals, and Hospital Beds in the U.S., 1967: Regional, State, County, Metropolitan Area.* J. N. Haug and G. A. Roback. Chicago. American Medical Association, 1968. Also unpublished data on Federal M.D.'s.

AOA Membership and Statistics Department: *A Statistical Study of the Osteopathic Profession,* December 31, 1967. Chicago. American Osteopathic Association, June 1968.

U.S. Bureau of the Census: Population estimates. *Current Population Reports.* Series P-25, No. 414, January 1969 and No. 392, May 1968.

Table 85. LOCATION OF NON-FEDERAL PHYSICIANS IN RELATION TO POPULATION: DECEMBER 31, 1967

Location	Civilian population in thousands July 1	All non-Federal physicians [1]				M.D.'s and D.O.'s providing patient care [2]			
		M.D. and D.O.	Number		Ratio per 100,000 civilians	M.D. and D.O.	Number		Ratio per 100,000 civilians
			M.D. only	D.O. only			M.D. only	D.O. only	
All locations	198,649	292,661	279,418	13,243	147	260,296	249,273	11,023	131
United States	195,669	290,420	277,177	13,243	148	258,279	247,256	11,023	132
Ala	3,499	2,871	2,867	4	82	2,621	2,619	2	75
Alaska	287	177	173	4	75	164	162	2	69
Ariz	1,607	2,347	2,068	279	146	2,035	1,790	245	127
Ark	1,968	1,710	1,688	22	87	1,520	1,505	15	77
Calif	18,613	34,555	34,135	420	186	30,345	30,204	141	163
Colo	1,966	3,685	3,425	260	187	3,248	3,013	235	165
Conn	2,996	5,422	5,367	55	187	4,776	4,735	41	164
Del	515	727	686	41	141	673	635	38	131
D.C	789	3,023	3,007	16	383	2,521	2,509	12	320
Fla	5,935	9,447	8,841	606	159	7,466	7,006	460	126
Ga	4,389	4,558	4,478	80	104	4,100	4,034	66	93
Hawaii	704	1,002	982	20	142	913	898	15	130
Idaho	697	676	639	37	97	622	598	24	89
Ill	10,828	14,996	14,652	344	138	13,551	13,313	238	125
Ind	5,001	5,158	4,960	198	103	4,690	4,516	174	94
Iowa	2,770	3,298	2,889	409	119	2,905	2,566	339	105
Kans	2,257	2,680	2,483	197	119	2,388	2,228	160	106
Ky	3,147	3,168	3,129	39	101	2,825	2,795	30	90
La	3,621	4,095	4,083	12	113	3,715	3,704	11	103
Maine	966	1,238	1,031	207	128	1,101	935	166	114
Md	3,606	6,374	6,351	23	177	5,481	5,466	15	152
Mass	5,395	11,195	10,913	282	208	9,765	9,584	181	181
Mich	8,588	12,643	10,541	2,102	147	11,522	9,590	1,932	134
Minn	3,619	5,414	5,351	63	150	4,852	4,802	50	134
Miss	2,319	1,768	1,767	1	76	1,604	1,603	1	69
Mo	4,547	6,832	5,677	1,155	150	5,946	5,030	916	131
Mont	689	726	686	40	105	673	645	28	98
Nebr	1,480	1,717	1,670	47	120	1,511	1,479	32	106
Nev	428	477	449	28	111	437	415	22	102
N.H	687	964	938	26	140	813	797	16	118
N.J	6,922	10,041	9,398	643	145	9,234	8,688	546	133
N.Mex	987	1,050	928	122	106	895	788	107	91
N.Y	17,986	40,646	40,082	564	226	36,516	36,044	472	203
N.C	4,949	5,168	5,136	32	104	4,505	4,484	21	91
N.Dak	620	585	575	10	94	544	535	9	88
Ohio	10,467	14,760	13,682	1,078	141	13,541	12,539	1,002	129
Okla	2,468	2,904	2,483	421	118	2,622	2,240	382	106
Oreg	1,976	2,935	2,766	169	149	2,558	2,422	136	129
Pa	11,655	18,728	17,163	1,565	161	16,734	15,380	1,354	144
R.I	880	1,433	1,349	84	163	1,328	1,255	73	151
S.C	2,564	2,111	2,105	6	82	1,910	1,906	4	74
S.Dak	661	575	538	37	87	534	503	31	81
Tenn	3,903	4,497	4,431	66	115	3,997	3,946	51	102
Tex	10,653	12,571	11,760	811	118	11,362	10,644	718	107
Utah	1,017	1,365	1,346	19	134	1,205	1,188	17	118

See footnotes at end of table.

Table 85. LOCATION OF NON-FEDERAL PHYSICIANS IN RELATION TO POPULATION: DECEMBER 31, 1967—Continued

Location	Civilian population in thousands July 1	All non-Federal physicians [1]				M.D.'s and D.O.'s providing patient care [2]			
		M.D. and D.O.	Number		Ratio per 100,000 civilians	M.D. and D.O.	Number		Ratio per 100,000 civilians
			M.D. only	D.O. only			M.D. only	D.O. only	
Vt	419	790	745	45	189	621	590	31	148
Va	4,365	5,183	5,147	36	119	4,567	4,538	29	105
Wash	3,145	4,725	4,515	210	150	4,136	3,973	163	132
W.Va	1,807	1,870	1,756	114	103	1,690	1,590	100	94
Wisc	4,191	5,218	5,037	181	125	4,700	4,539	161	112
Wyo	315	322	309	13	102	297	288	9	94
P.R	2,682	2,038	2,038	—	76	1,836	1,836	—	68
U.S. outlying areas	296	203	203	—	69	181	181	—	61

[1] Excludes 27,724 Federal physicians (27,552 M.D.'s and 172 D.O.'s) and 1,660 with addresses temporarily unknown to the AMA. Includes 14,198 inactive physicians (12,898 M.D.'s and 1,300 D.O.'s).

[2] M.D.'s include those in solo, partnership, group or other practice and those in training programs and in hospital-based practice; D.O.'s include those in private practice and those in training programs and professional full-time hospital positions. Excludes 30,145 non-Federal M.D.'s (11,166 on medical school faculties; 2,729 in administration; 3,852 in research; and 12,898 in inactive status), and 1,660 with addresses temporarily unknown to the AMA; and 1,486 non-Federal D.O.'s (17 in full-time administrative hospital positions; 127 on college faculties; 42 in miscellaneous activities; and 1,300 in inactive status) and 734 whose status was not reported to the AOA.

Sources: AMA Department of Survey Research: *Distribution of Physicians, Hospitals, and Hospital Beds in the U.S., 1967: Regional, State, County, Metropolitan Area.* J. N. Haug and G. A. Roback. Chicago American Medical Association, 1968.

AOA Membership and Statistics Department: *A Statistical Study of the Osteopathic Profession, December 31, 1967.* Chicago. American Osteopathic Association, June 1968. Also, unpublished data.

U.S. Bureau of the Census: Population estimates. *Current Population Reports.* Series P-25, No. 414. January 1969, and No. 392, May 1968.

Table 86. LOCATION OF ACTIVE NON-FEDERAL PHYSICIANS PROVIDING PATIENT CARE BY TYPE OF PRACTICE: DECEMBER 31, 1967

Location	Number of M.D.'s					Number of D.O.'s			
	Total	Solo, partnership, group, or other practice	Hospital-based practice			Total	Private practice	Hospital-based practice	
			Interns	Residents and fellows	Full-time physician staff			Training programs	Full-time physician staff
All locations	249,273	190,079	9,868	32,722	16,604	11,023	10,067	775	181
United States	247,256	188,772	9,813	32,517	16,154	11,023	10,067	775	181
Ala	2,619	2,217	91	218	93	2	2	—	—
Alaska	162	154	—	—	8	2	2	—	—
Ariz	1,790	1,528	81	115	66	245	225	15	5
Ark	1,505	1,306	30	112	57	15	15	—	—
Calif	30,204	25,120	984	2,579	1,521	141	141	—	—
Colo	3,013	2,258	154	459	142	235	222	11	2
Conn	4,735	3,468	215	652	400	41	41	—	—
Del	635	496	11	54	74	38	36	2	—

Table 86. LOCATION OF ACTIVE NON-FEDERAL PHYSICIANS PROVIDING PATIENT CARE BY TYPE OF PRACTICE: DECEMBER 31, 1967—Continued

Location	Number of M.D.'s					Number of D.O.'s			
	Total	Solo, partnership, group, or other practice	Hospital-based practice			Total	Private practice	Hospital-based practice	
			Interns	Residents and fellows	Full-time physician staff			Training programs	Full-time physician staff
D.C.	2,509	1,524	159	602	224	12	12	—	—
Fla.	7,006	5,641	219	738	408	460	437	16	7
Ga.	4,034	3,165	176	502	191	66	63	3	—
Hawaii	898	751	34	61	52	15	15	—	—
Idaho	598	580	—	—	18	24	24	—	—
Ill.	13,313	10,004	674	1,731	904	238	212	17	9
Ind.	4,516	3,916	113	292	195	174	166	4	4
Iowa	2,566	2,078	77	304	107	339	326	9	4
Kans.	2,228	1,744	50	286	148	160	160	—	—
Ky.	2,795	2,277	78	279	161	30	30	—	—
La.	3,794	2,859	173	499	173	11	11	—	—
Maine	935	817	12	29	77	166	151	10	5
Md.	5,466	3,423	303	1,181	549	15	15	—	—
Mass.	9,584	6,422	377	1,798	987	181	178	2	1
Mich.	9,590	6,726	392	1,722	750	1,932	1,590	290	52
Minn.	4,802	3,369	165	996	272	50	49	1	—
Miss.	1,603	1,410	20	116	57	1	1	—	—
Mo.	5,030	3,584	221	883	342	916	829	63	24
Mont.	645	628	—	—	17	28	28	—	—
Nebr.	1,479	1,254	56	115	54	32	32	—	—
Nev.	415	392	—	—	23	22	22	—	—
N.H.	797	686	19	51	41	16	16	—	—
N.J.	8,683	7,027	364	691	606	546	514	23	9
N.Mex.	788	690	21	46	31	107	107	—	—
N.Y.	36,044	24,471	1,706	6,453	3,414	472	455	16	1
N.C.	4,484	3,489	149	632	214	21	21	—	—
N.Dak.	535	495	1	11	28	9	9	—	—
Ohio	12,539	9,200	610	1,965	764	1,002	862	126	14
Okla.	2,240	1,890	68	207	75	382	352	29	1
Oreg.	2,422	2,041	79	219	83	136	133	3	—
Pa.	15,380	11,303	741	2,225	1,111	1,351	1,221	106	27
R.I.	1,255	964	51	116	124	73	70	1	2
S.C.	1,906	1,640	48	144	74	4	4	—	—
S.Dak.	503	467	12	9	15	31	30	1	—
Tenn.	3,946	2,996	202	551	197	51	51	—	—
Tex.	10,641	8,860	304	1,068	412	718	689	20	9
Utah	1,188	935	64	153	36	17	17	—	—
Vt.	590	428	28	94	40	31	31	—	—
Va.	4,538	3,564	159	543	272	29	28	1	—
Wash.	3,973	3,281	124	379	189	163	160	3	—
W.Va.	1,590	1,289	39	142	120	100	99	—	1
Wisc.	4,539	3,656	159	495	229	161	154	3	4
Wyo.	288	279	—	—	9	9	9	—	—
P.R.	1,836	1,247	39	185	365	—	—	—	—
U.S. outlying areas	181	60	16	20	85	—	—	—	—

Sources: AMA Department of Survey Research. *Distribution of Physicians, Hospitals, and Hospital Beds in the U.S., 1967, Regional, State, County, Metropolitan Area.* J. N. Haug and G. A. Roback. Chicago. American Medical Association, 1968.

AOA Membership and Statistics Department: *A Statistical Study of the Osteopathic Profession, December 31, 1967.* Chicago. American Osteopathic Association, June 1968. Also, unpublished data.

Table 87. TYPE OF PRACTICE AND PRIMARY SPECIALTY OF FEDERAL AND NON-FEDERAL PHYSICIANS: 1967

Primary specialty	M.D.'s						D.O.'s
	Total physicians	Total active [1]	Patient care			Other professional activity	
			Solo, partnership, group, or other practice	Hospital-based practice			
				Training programs	Full-time physician staff		
Total	305,453	294,072	190,079	46,856	37,255	19,882	[2] 11,381
General practice [3]	91,944	83,293	63,543	8,786	7,080	3,884	[4] 8,651
Specialty practice	212,195	210,779	126,536	38,070	30,175	15,998	1,419
Medical specialties	69,281	68,927	40,113	12,498	9,571	6,745	356
Allergy	964	962	872	26	34	30	2
Cardiovascular disease	2,265	2,263	1,162	421	324	356	2
Dermatology	3,816	3,796	2,807	510	260	219	20
Gastroenterology	749	749	408	135	106	100	—
Internal medicine	42,591	42,325	23,952	8,055	6,205	4,113	266
Pediatrics	17,678	17,614	10,466	3,281	2,118	1,749	64
Pulmonary diseases	1,218	1,218	446	70	524	178	—
Surgical specialties	92,663	91,822	63,317	16,409	8,764	3,332	841
Anesthesiology	9,810	9,630	6,681	1,296	1,164	489	180
Colon and rectal surgery	687	644	610	17	12	5	43
General surgery	29,960	29,687	18,365	6,989	3,309	1,024	273
Neurological surgery	2,320	2,315	1,390	502	243	180	5
Obstetrics and gynecology	18,044	17,964	13,125	2,667	1,499	673	80
Ophthalmology [5]	9,216	9,083	7,048	1,247	540	248	133
Orthopedic surgery	8,499	8,426	5,853	1,557	807	209	73
Otolaryngology	5,606	5,583	4,239	807	382	155	23
Plastic surgery	1,304	1,303	948	220	98	37	1
Thoracic surgery	1,730	1,725	1,093	228	254	150	5
Urology	5,487	5,462	3,965	879	456	162	25
Psychiatry and neurology	23,326	23,295	10,809	4,491	5,432	2,563	31
Child psychiatry	1,080	1,080	475	255	201	149	—
Neurology	2,469	2,466	912	611	444	499	3
Psychiatry	19,777	19,749	9,422	3,625	4,787	1,915	28
Other specialties	26,925	26,735	12,297	4,672	6,408	3,358	190
Aviation medicine	792	792	87	64	459	182	—
General preventive medicine	1,007	1,007	395	61	171	380	—
Occupational medicine	1,709	1,706	1,416	17	100	173	3
Pathology	9,564	9,518	2,783	2,222	3,086	1,427	46
Physical medicine and rehabilitation	1,217	1,208	386	234	413	175	9
Public health	1,627	1,627	984	51	158	434	—
Radiology	11,009	10,877	6,246	2,023	2,021	587	132

See footnotes at top of facing page.

Table 87. TYPE OF PRACTICE AND PRIMARY SPECIALTY OF FEDERAL AND NON-FEDERAL PHYSICIANS: 1967—Continued

[1] Excludes 1,660 M.D.'s with addresses unknown.

[2] Includes 1,314 D.O.'s (775 in training programs; 181 in full-time hospital staff positions; and 186 in other professional activities; and 172 Federal D.O.'s) for which data are not available on specialties. Excludes 1,300 inactive D.O.'s and 734 D.O.'s with status not reported.

[3] Includes no specialty and other specialties not recognized.

[4] Includes 827 with practice limited to manipulative therapy.

[5] Since 1966 the National Center for Health Statistics has been conducting detailed manpower surveys in specific categories of health services personnel. The first of these to deal with a medical specialty category is a survey of ophthalmologists, undertaken in 1968. Survey results will be published by the National Center for Health Statistics during 1970.

Sources: AMA Department of Survey Research: *Distribution of Physicians, Hospitals, and Hospital Beds in the U.S., 1967, Regional, State, County, Metropolitan Area.* J. N. Haug and G. A. Roback. Chicago. American Medical Association, 1968.

AOA Membership and Statistics Department: *A Statistical Study of the Osteopathic Profession, December 31, 1967.* Chicago. American Osteopathic Association, June 1968.

Table 88. MEDICAL AND OSTEOPATHIC SCHOOLS, STUDENTS, AND GRADUATES: SELECTED YEARS, 1949-50 THROUGH 1967-68

Academic year	Medicine				Osteopathy			
		Students				Students		
	Schools	Total	First year	Graduates	Schools	Total	First year	Graduates
1967–68	95	34,545	9,486	7,973	5	1,823	509	427
1966–67	90	33,449	8,990	7,743	5	1,763	480	405
1965–66	88	32,835	8,759	7,574	5	1,681	464	360
1964–65	88	32,428	8,856	7,409	5	1,661	472	394
1963–64	87	32,001	8,772	7,336	5	1,594	441	355
1962–63	87	31,491	8,642	7,264	5	1,581	433	367
1961–62	87	31,078	8,483	7,168	5	1,555	439	363
1960–61	86	30,288	8,298	6,994	6	1,944	496	506
1959–60	85	30,084	8,173	7,081	6	1,915	505	427
1954–55	81	28,583	7,104	6,977	6	1,867	487	459
1949–50	79	25,103	7,042	5,553	6	1,778	----------	373

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* 206(9). Chicago. American Medical Association, November 25, 1968. Also prior annual issues.

Mills, L. W.: *Educational Supplement.* 20(1). Chicago. Office of Education. American Osteopathic Association, January 1968. Also, prior annual issues.

Bureau of Health Professions Education and Manpower Training, Office of Program Planning and Evaluation.

Table 89. LOCATION AND OWNERSHIP OF MEDICAL AND OSTEOPATHIC SCHOOLS AND NUMBER OF STUDENTS AND GRADUATES: 1967-68

Location	School	Ownership	Students		Graduates
			Total	First year	
	Total, 100 schools		36,368	9,995	8,400
	4-year medical schools				
Ala.	Medical College of Alabama, Birmingham	Public	325	89	7[illegible]
Ark.	University of Arkansas School of Medicine, Little Rock	do	388	113	84
Calif.	Loma Linda University School of Medicine, Loma Linda, Los Angeles.	Private	346	102	83
	Stanford University School of Medicine, Palo Alto	do	332	76	61
	University of California College of Medicine, Irvine	Public	290	64	89
	University of California School of Medicine, Los Angeles	do	336	111	73
	University of California School of Medicine, San Francisco	do	522	131	128
	University of Southern California School of Medicine, Los Angeles.	Private	280	73	67
Colo.	University of Colorado School of Medicine, Denver	Public	339	88	88
Conn.	Yale University School of Medicine, New Haven	Private	344	92	81
D.C.	Georgetown University School of Medicine, Washington	do	453	121	109
	George Washington University School of Medicine, Washington.	do	412	112	105
	Howard University College of Medicine, Washington	do	398	111	93
Fla.	University of Florida College of Medicine, Gainesville	Public	237	66	55
	University of Miami School of Medicine, Coral Gables	Private	329	88	77
Ga.	Emory University School of Medicine, Atlanta	do	290	79	66
	Medical College of Georgia, Augusta	Public	388	105	93
Ill.	Chicago Medical School, Chicago	Private	288	74	73
	Northwestern University Medical School, Chicago	do	552	136	135
	Stritch School of Medicine of Loyola University, Chicago	do	363	110	82
	University of Chicago Pritzker School of Medicine, Chicago.	do	285	79	68
	University of Illinois College of Medicine, Chicago	Public	782	205	182
Ind.	Indiana University School of Medicine, Indianapolis	do	842	221	209
Iowa	University of Iowa College of Medicine, Iowa City	do	492	127	125
Kans.	University of Kansas School of Medicine, Kansas City	do	466	130	100
Ky.	University of Kentucky College of Medicine, Lexington	do	291	83	58
	University of Louisville School of Medicine, Louisville	Public	370	99	92
La.	Louisiana State University School of Medicine, New Orleans.	do	513	145	115
	Tulane University School of Medicine, New Orleans	Private	508	139	122
Md.	Johns Hopkins University School of Medicine, Baltimore	do	366	95	89
	University of Maryland School of Medicine, Baltimore	Public	510	140	118
Mass.	Boston University School of Medicine, Boston	Private	293	75	77
	Harvard Medical School, Boston	do	562	126	139
	Tufts University School of Medicine, Boston	do	446	120	110
Mich.	University of Michigan Medical School, Ann Arbor	Public	797	210	186
	Wayne State University School of Medicine, Detroit	do	537	139	125
Minn.	University of Minnesota Medical School, Minneapolis	do	663	168	152
Miss.	University of Mississippi School of Medicine, Jackson	do	306	86	65
Mo.	Saint Louis University School of Medicine, St. Louis	Private	454	130	109
	University of Missouri School of Medicine, Columbia	Public	334	93	74
	Washington University School of Medicine, St. Louis	Private	352	97	83
Nebr.	Creighton University School of Medicine, Omaha	do	291	83	61
	University of Nebraska College of Medicine, Omaha	Public	350	93	94

See footnotes at end of table.

Table 89. LOCATION AND OWNERSHIP OF MEDICAL AND OSTEOPATHIC SCHOOLS AND NUMBER OF STUDENTS AND GRADUATES: 1967-68—Continued

Location	School	Ownership	Students		Graduates
			Total	First year	
	4-year medical schools—Continued				
N.J.	New Jersey College of Medicine and Dentistry, Newark	Public	304	83	71
N.M.	University of New Mexico School of Medicine, Albuquerque.	do	85	26	19
N.Y.	Albany Medical College of Union University, Albany	Private	274	71	63
	Albert Einstein College of Medicine of Yeshiva University, New York.	do	387	105	94
	Columbia University College of Physicians and Surgeons, New York.	do	479	133	107
	Cornell University Medical College, New York	do	344	90	86
	New York Medical College, New York	do	499	133	119
	New York University School of Medicine, New York	do	506	132	121
	State University of New York at Buffalo School of Medicine, Buffalo.	Public	397	109	92
	State University of New York College of Medicine, Brooklyn.	do	771	201	196
	State University of New York College of Medicine, Syracuse.	do	394	105	94
	University of Rochester School of Medicine and Dentistry, Rochester.	Private	290	79	64
N.C.	Bowman Gray School of Medicine of Wake Forest College, Winston-Salem.	do	224	63	52
	Duke University School of Medicine, Durham	do	329	87	83
	University of North Carolina School of Medicine, Chapel Hill.	Public	288	75	68
Ohio	Ohio State University College of Medicine, Columbus	do	593	157	136
	University of Cincinnati College of Medicine, Cincinnati	do	400	106	96
	Case Western Reserve University School of Medicine, Cleveland.	Private	353	91	79
Okla.	University of Oklahoma School of Medicine, Oklahoma City.	Public	404	110	92
Oreg.	University of Oregon Medical School, Portland	do	332	90	68
Pa.	Hahnemann Medical College of Philadelphia, Philadelphia	Private	425	115	102
	Jefferson Medical College of Philadelphia, Philadelphia	do	685	186	157
	Temple University School of Medicine, Philadelphia	Public	552	139	143
	University of Pennsylvania School of Medicine, Philadelphia.	Private	516	133	129
	University of Pittsburgh School of Medicine, Pittsburgh	do	390	108	93
	Woman's Medical College of Pennsylvania, Philadelphia	do	225	69	37
S.C.	Medical College of South Carolina, Charleston	Public	302	82	66
Tenn.	Meharry Medical College, Nashville	Private	251	85	49
	University of Tennessee College of Medicine, Memphis	Public	695	204	141
	Vanderbilt University School of Medicine, Nashville	Private	217	59	50
Tex.	Baylor University College of Medicine, Houston	do	350	85	85
	University of Texas Medical Branch, Galveston	Public	589	164	139
	University of Texas Southwestern Medical School, Dallas	do	407	108	96
Utah	University of Utah College of Medicine, Salt Lake City	do	248	66	54
Vt.	University of Vermont College of Medicine, Burlington	do	202	55	44
Va.	Medical College of Virginia, Richmond	do	416	129	80
	University of Virginia School of Medicine, Charlottesville	do	302	81	69
Wash.	University of Washington School of Medicine, Seattle	do	327	82	83

See footnotes at end of table.

Table 89. LOCATION AND OWNERSHIP OF MEDICAL AND OSTEOPATHIC SCHOOLS AND NUMBER OF STUDENTS AND GRADUATES: 1967-68—Continued

Location	School	Ownership	Students		Graduates
			Total	First year	
	4-year medical schools—Continued				
W.Va.	West Virginia University School of Medicine, Morgantown	Public	247	69	59
Wisc.	Marquette University School of Medicine, Milwaukee	Private	399	111	90
	University of Wisconsin Medical School, Madison	Public	406	106	97
P.R.	University of Puerto Rico School of Medicine, San Juan	do	234	71	43
	Approved schools of basic medical sciences				
N.H.	Dartmouth Medical School, Hanover	Private	95	48	
N.J.	Rutgers, The State University, Rutgers	Public	32	16	
N.Dak.	University of North Dakota School of Medicine, Grand Forks.	do	92	49	
S.Dak.	State University of South Dakota School of Medicine, Vermillion.	do	93	49	
	Developing medical schools—operational				
Ariz.	University of Arizona College of Medicine, Tucson	do	32	32	
Hawaii	University of Hawaii School of Medicine, Honolulu	do	28	28	
Mich.	Michigan State University College of Human Medicine, East Lansing.	do	53	27	
Pa.	The Pennsylvania State University College of Medicine Milton S. Hershey Medical Center, Hershey.	do	40	40	
R.I.	Brown University Program in Medical Science, Providence	Private	13	13	
Tex.	The University of Texas Medical School at San Antonio, San Antonio.	Public	7	7	
	4-year osteopathic schools				
Ill.	Chicago College of Osteopathy, Chicago	Private	282	79	59
Iowa	College of Osteopathic Medicine and Surgery, Des Moines	do	338	97	79
Mo.	Kansas City College of Osteopathy and Surgery, Kansas City.	do	428	114	106
	Kirksville College of Osteopathy and Surgery, Kirksville	do	396	106	93
Pa.	Philadelphia College of Osteopathic Medicine, Philadelphia	do	379	113	90

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* 206(9). Chicago. American Medical Association, November 1968.

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CHAPTER 19

Midwifery

Midwifery, or obstetrics, involves assistance to women during pregnancy, labor, delivery, and the postpartum period. Births in the United States are attended by three basic groups of physicians: obstetricians, general practitioners, and house staff of hospitals. In addition there are approximately 1,000 trained nurse-midwives in the United States (*37*) most of whom are actively engaged in this health profession and 4,400 lay midwives who provide assistance to women during the maternity cycle. (See ch. 35 for obstetrical aides.)

In 1967, 40,200 live births or 1.1 percent of the total for the United States were reported on the birth certificate as attended by midwives. The proportion has declined from 10.7 percent in 1935 to 4.5 percent in 1950, 2.9 percent in 1955, and 2.0 percent in 1960 (*38*). Comparative data on the number of midwives in the United States and outlying areas for selected years are shown in table 90.

The *nurse-midwife* is a registered nurse (R.N.) who has successfully completed a recognized program of study, usually 6 to 8 months in length—plus clinical experience leading to a certificate in nurse-midwifery. An alternate method for obtaining a certificate requires a master's degree in nursing, and additional education in midwifery ranging from 12 to 24 months (table 91). More than 1,000 nurses have received certificates in nurse-midwifery (*39*).

The nurse-midwife is prepared to provide prenatal, intrapartum and postpartum care geared to the individual needs of each mother and family. She cares for the mother during pregnancy and stays with her in labor, providing continuous physical and emotional support. She evaluates progress and manages the labor and delivery, watchful for signs requiring medical attention. She evaluates and provides immediate care for the newborn. She helps the mother to care for herself and for her infant; to adjust the home situation to the new child; and to lay a healthful foundation for future pregnancies. The nurse-midwife is prepared to teach, interpret and provide support as an integral part of her service. The American nurse-midwife always functions within the framework of a medically directed health service (*40*).

The number of births attended by nurse-midwives in 1968, is estimated at over 3,700, although the actual number is not identifiable since the attendant category on the birth certificate lists only midwife (*37*).

Studies by the Research Committee of the American College of Nurse-Midwives (705 members) show that the majority of nurse-midwives are located in the eastern half of the country (*37*). Licensure laws for nurse-midwives exist in the State of New Mexico and the city of New York. In other States nurse-midwives function under the lay midwives licensure.

In contrast to the lay midwife, the nurse-midwife functions as a member of the obstetrical team in medical centers, institutions, universities and community health projects with active programs of nurse-midwifery (*40*), (*41*). The number of nurse-midwives had almost doubled during each successive 10-year period since 1935 whereas the number of lay midwives has shown a steady decline (*41*).

The *lay midwife* provides assistance to women during childbirth in the absence of a medical practitioner. She is usually a woman with limited education who learns largely through apprenticeship. She generally serves in low economic or rural areas, where the delivery of the baby usually occurs in the home.

Twenty-three States and the District of Columbia have licensing or registration laws for lay midwives. In others, permits to practice are issued annually in an attempt to keep them under supervision. Unlicensed midwives generally practice under the supervision of State health department public health personnel. Under the direction of the State health department, public health nurses and others may hold classes to instruct them in the selection of materials and simple procedures.

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(37) American College of Nurse-Midwifery: *Descriptive Data, Nurse-Midwives—USA.* New York, April 1968.

(38) National Center for Health Statistics: *Vital Statistics of the United States, 1967.* Vol. 1. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969. Also prior annual editions.

(39) The American College of Nurse-Midwives: *What is a Nurse-Midwife?*

(40) Definition—The American College of Nurse-Midwifery, 1954.

(41) American Medical Association: *Today's Health.* Chicago, February 1968.

Table 90. LOCATION OF MIDWIVES: SELECTED STATES AND YEARS, 1948 THROUGH 1968

State	1948	1955 or 1956	1964	1967	1968
Total, all locations			6,690	5,240	4,810
United States	20,700	11,500	6,011	4,744	4,412
Alabama	1,701	1,316	713	590	500
Arizona	(1)	50	14	11	9
Arkansas	1,137	473	263	214	180
Connecticut	(1)	(1)	5	1	1
Delaware	(1)	(1)	3	2	
Florida	455	336	189	154	150
Georgia	1,560	977	340	270	270
Hawaii	(1)	(1)	5	3	—
Indiana	(1)	(1)	2	2	2
Kentucky	1,200	604	287	32	32
Louisiana	1,229	473	198	148	130
Maryland	160	71	32	18	31
Mississippi	2,261	1,300	811	672	560
Missouri	46	(2)	38	26	26
New Jersey	161	(2)	6	1	3
New Mexico	268	192	88	57	24
New York	(1)	(1)		39	50
North Carolina	869	486	147	83	83
Ohio	450	(2)			
Oklahoma	185	(2)			
Pennsylvania	268	172	74	66	5
South Carolina	1,513	1,028	525	354	310
Tennessee	1,278	624	232	200	180
Texas	3,262	(2)	1,500	1,500	1,500
Virginia	2,000	820	485	273	270
West Virginia	194	119	54	28	24
Other States and D.C.	503	250			
Guam			2	1	
Puerto Rico			661	472	380
Virgin Islands			16	23	18

[1] Included in "other States and D.C."

[2] An estimated 2,209 midwives were practicing in these States in 1955 or 1956.

Sources: Jacobson, P. H.: Hospital care and the vanishing midwife. *Milbank Mem. Fund Quart.* 34(3): 255–257, July 1956. Data for 1948.

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U.S. Department of Health, Education, and Welfare, Social and Rehabilitation Service, National Center for Social Statistics: *Statistical Summary of Cases Served Under Maternal and Child Health Programs of State and Local Health Departments, fiscal year, 1968.*

Table 91. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING PROGRAMS IN NURSE-MIDWIFERY: 1967-68

Location	Institution	Ownership	Curriculum offered	
			Certificate	Master's degree
	Total, 11 schools		11	7
Connecticut	Yale University School of Nursing, New Haven	Private	×	×
District of Columbia	The Catholic University of America, Washington	do	×	×
Kentucky	Frontier Nursing Service, School of Nurse-Midwifery, Wendover.	do	×	×
Maryland	The Johns Hopkins University, Nurse-Midwifery Program, Baltimore.	do	×	×
New Mexico	Catholic Maternity Institute, School of Nurse-Midwifery, Santa Fe.	do	×	
New York	Columbia University Graduate Program in Maternity Nursing, New York.	do	×	×
	Maternity Center Association, Downstate Medical Center, New York.	Public	×	
	New York Medical College, Graduate School of Nursing, New York.	Private	×	×
Utah	University of Utah Medical Center, Salt Lake City	Public	×	×
Puerto Rico	Puerto Rico Nurse-Midwifery Program, Caparra Heights.	do	×	
	Ponce School of Maternity and Nurse-Midwifery, Ponce.	do	×	

Source. The American College of Nurse-Midwives.

CHAPTER 20

Nursing and Related Services*

Nursing services which contribute to the health and well-being of people are provided today by a wide variety of practitioners. The registered nurse may be complemented and supplemented by other types of nursing personnel whose duties and competencies are carefully delineated.

The several categories of personnel considered in this section are shown below, with recent estimates of the number of persons employed at the beginning of 1969:

Occupation:	*Number employed*
Registered nurses	680,000
Practical nurses	345,000
Nursing aides, orderlies, attendants	786,000
Home health aides-homemakers	14,000

Not included, since they receive on-the-job training in relation to the activities delegated to them are *ward clerks*, sometimes called *floor clerks*, who act as receptionists and also relieve the nurse of much of the paper work in the patient-care units of an institution.

Registered Nurses

Individuals in this profession may function in a variety of positions within different employment settings. They render nursing care to patients or perform specialized duties in hospitals, infirmaries, nursing homes, sanatoriums, clinics, doctors' offices, industrial plants, schools, or in patients' homes through a public health department or other service agency. They also serve as teachers of nursing. *Registered nurses*—sometimes called *graduate nurses*—are responsible for the nature and quality of all nursing care that patients receive. They are also responsible for carrying out the physicians' instructions and for supervising practical nurses and other nonprofessional personnel who perform routine care and treatment of patients.

Registered nurses in practice in the United States numbered about 680,000 as of January 1, 1969, an increase of 21,000 over the previous year, according to the Interagency Conference on Nursing Statistics. National estimates of employed nurses since 1954 have been compiled from various sources by the Interagency Conference on Nursing Statistics, composed of representatives from the American Nurses' Association, the National League for Nursing, the U.S. Public Health Service, and other agencies. Between 1950 and 1969, the number of employed registered nurses increased by 305,000. The effect, however, was not as great as it appeared to be since the number of part-time nurses increased at a more rapid rate than those working full-time (table 92). The Interagency Conference on Nursing also estimated that as of January 1, 1968 about 69 percent of the active registered nurses were employed in hospitals, nursing homes, and related institutions. Public health, school, and occupational health nurses comprised 10 percent of the total (table 93).

A total of 909,131 registered nurses were included in the 1966 Inventory conducted by the American Nurses' Association through the cooperation of the State boards of nursing, which are the official licensing agencies for nurses (*42*). Included in this total were 593,694 persons actively employed in nursing, 285,791 not employed in nursing, and 29,646 for whom activity status was not reported (table 94).

The State distribution of registered nurses in hospitals based on the 1966 American Hospital Association's survey of hospital manpower is presented in table 95. The State distribution of registered nurses employed in nursing and related homes, based on the National Center for Health Statistics 1967 Master Facility Inventory, is presented in table 96.

A license to practice nursing is required in all States and the District of Columbia (*42*). For

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* This chapter was originally prepared by the Public Health Service, Division of Nursing, Manpower Analysis and Resources Branch—Dr. Eugene Levine, Chief, and updated by the National Center for Health Statistics, Division of Health Resources Statistics.

licensure as a registered nurse (R.N.), an applicant must have graduated from a school of nursing approved by the State board for nursing and have passed a State board examination.

Graduation from high school is required for admission to all schools of nursing. There are three alternative initial programs of nursing education which prepare persons for licensure as R.N.'s. Diploma programs are conducted by hospital schools, and usually require 3 years of training; associate degree programs usually located in community colleges are approximately 2 years in length; baccalaureate programs usually require 4 years of study in a college or university, although a few require 5 years (*43*). In October 1968, 1,287 schools offered 1,293 programs in which 145,588 students were enrolled. The 1967–68 graduates totaled 41,555 of whom 68 percent were graduated from diploma programs. A phenomenal increase has occurred in graduations from associate degree programs—from 252 in 1955–56 to 6,213 in 1967–68. The number of baccalaureates has increased to 7,145 from 3,156 in 1955–56 (tables 97 and 98).

In 1968, in addition to the degrees earned in the initial programs of nursing education, 2,164 baccalaureates, 1,615 master's degrees, and 23 doctorates in nursing were awarded in 1968 to graduate nurses.

The American Nurses' Association, with about 200,000 members in 1968, is the professional organization for registered nurses.

Practical Nurses

Practical nurses, also known as *vocational nurses*, provide nursing care and treatment of patients under the supervision of a licensed physician or registered nurse. They are expected to utilize appropriate and safe nursing techniques in providing such treatments as drainage, irrigation, catheterization, routine medication if permitted by the institution, and in taking and recording temperature, pulse, respiration, and blood pressure. They may also assist with the supervision of nursing aides, orderlies, and attendants.

Practical nurses employed in the United States numbered about 345,000 as of January 1, 1969, an increase of 25,000 over the previous year, according to the Public Health Service Division of Nursing estimates. The growth in employment has been rapid, increasing from the census enumerations of 137,500 in 1950 and 206,000 in 1960 to the present 345,000 (tables 99 and 100).

The majority of practical nurses work in hospitals, clinics, homes for the aged and nursing homes. In 1966 an estimated 15..,000 were employed in AHA registered hospitals (table 101). About 40,000 were employed in nursing and related homes in 1967 (table 102). Many others are employed in private homes. Most of the remainder work in doctors' offices, schools, and public health agencies. In 1968, 1,750 licensed practical nurses were employed in public health work under the supervision of public health staff nurses (*44*).

Licensure of practical nurses is provided for by law in the 50 States and the District of Columbia. For licensure as a licensed practical nurse (L.P.N.), or licensed vocational nurse (L.V.N. in California and Texas), an applicant must graduate from a State-approved school of practical nursing and pass a State board examination.

Requirements for admission to a practical nursing school program vary. In most States the applicants are required to have completed at least 2 years of high school; a few States require a high school diploma. The program is usually 12 to 18 months and may be obtained in trade, technical, or vocational schools operated by public school systems or in private schools controlled by hospitals, health agencies, or colleges. By October 1968, 1,191 programs of practical nursing education were approved by the State agencies (*45*). Reports from 1,145 programs indicated 45,076 admissions and 30,833 graduates in 1967–68 (tables 103 and 104).

The National Federation of Licensed Practical Nurses, with about 28,000 members in 1967, is the association for licensed practical or vocational nurses.

Nursing Aides, Orderlies, and Attendants

Auxiliary nursing workers in hospitals and nursing homes function as assistants to nurses in providing many services related to the comfort and welfare of patients. *Nursing aides*, usually women, assist registered and practical nurses by performing less skilled tasks in the care of patients. *Orderlies* and *attendants*, usually men, assist by performing a variety of duties for male patients and certain heavy duties in the care of the physically ill, mentally ill, and mentally retarded.

Based on data from the American Hospital Association, the number of aides, orderlies, and attendants in hospitals and other institutions rose

from 221,000 persons employed in 1950 to 375,000 persons in 1960. In 1966, a survey by the American Hospital Association indicated that almost 500,000 aides, orderlies, and attendants were employed in hospitals, including 117,600 persons working as psychiatric aides in mental institutions (tables 105 and 106). Not included here are surgical technical aides which are discussed in chapter 35.

The total number of aides, orderlies, and attendants employed in 1969 was estimated at 786,000 by the U.S. Public Health Service Division of Nursing. This is less than had been estimated in the previous edition of this publication.

Although there are no definite educational requirements, on-the-job training programs provided by hospitals and clinics may include classroom instruction, demonstration, and practice taught by a registered nurse. The training programs may cover several months, depending on the hospital.

Psychiatric aides are licensed in three States—Arkansas, California, and Michigan.

There is no national association for membership of individuals employed as aides, orderlies, and attendants.

Home Health Aides and Homemakers

Home health aides—also called *home aides* or *visiting health aides*—give supportive services which are required to provide and maintain normal bodily and emotional comfort and to assist the patient toward independent living in a safe environment. The services are given under the supervision of a nurse, or, when appropriate, of a physical, speech, or occupational therapist. The home health aide may help the patient with bathing; caring for mouth, skin, and hair; getting in and out of bed; getting to the bathroom or using a bedpan; doing prescribed exercises; relearning household skills; eating and preparing meals; and taking medications that are ordinarily self-administered. She may perform those household services which will facilitate the patient's health care at home and are necessary to prevent or postpone institutionalization. Most *homemakers* also provide these services, although some provide care and assistance to families and individuals in times of stress resulting from problems other than illness.

The total number of home health aides and homemakers has increased from about 500 employed in 1950, to 2,300 in 1960, to 6,000 in 1965, and over 14,000 in 1969. More than 900 home health aide and homemaker service programs are in public and voluntary agencies now operating in 50 States, the District of Columbia, and Puerto Rico (*46*).

Home health aides are often recruited from persons who have had little formal education and no health training. The employing agency is responsible for on-the-job training, with a nurse providing the basic and on-going training in personal care services, and with other health personnel involved in their appropriate aspects. A State license is not required for persons providing homemaker services.

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(*45*) National League for Nursing: *State Approved Schools of Nursing—LPN/LVN.* New York, 1969. Published annually.

(*46*) Doscher, V. R.: *Report of the 1964 National Conference on Homemaker Services.* New York. National Council for Homemaker Services, 1964. Also correspondence with the National Council for Homemaker Services.

Table 92. REGISTERED NURSES IN RELATION TO POPULATION: SELECTED YEARS, 1950 THROUGH 1969

Year	Resident population in thousands [1]	Number of nurses in practice			Nurses per 100,000 population
		Total	Full time	Part time	
1969 [2]	200,985	680,000	493,000	187,000	338
1968 [2]	199,017	659,000	483,000	176,000	331
1967 [2]	196,858	640,000	474,000	166,000	325
1966 [2]	194,899	621,000	466,000	155,000	319
1964 [2]	190,169	582,000	450,000	132,000	306
1962 [2]	184,598	550,000	433,000	117,000	298
1960 [2]	178,729	504,000	414,000	90,000	282
1958	171,922	460,000			268
1956	165,931	430,000			259
1954	159,825	401,600			251
1950	150,697	375,000	335,000	40,000	249

[1] For 1954–68 as of January 1; for 1950 as of April 1.

[2] In 50 States and the District of Columbia.

Sources: Interagency Conference on Nursing Statistics for 1954–69 estimates; U.S. Bureau of the Census for 1950 data on nurses (adjusted).

U.S. Bureau of the Census: Population estimates. *Current Population Reports*. Series P-25, Nos. 223, 229, 327, 361, 389, and 447.

Table 93. FIELD OF EMPLOYMENT OF REGISTERED NURSES: JANUARY 1, 1967

Field of employment	Number of nurses [1]	Percent of total	Field of employment	Number of nurses [1]	Percent of total
Total	659,000	100.0	Occupational health	19,600	3.0
			Nursing education	27,800	4.2
Hospitals, nursing homes, and related institutions	452,500	68.7	Private duty, office and other fields	112,000	17.0
Public health and school	47,100	7.1			

[1] In 50 States and the District of Columbia.

Source: Interagency Conference on Nursing Statistics, 1969.

Table 94. LOCATION OF REGISTERED NURSES ACCORDING TO ACTIVITY STATUS AND RATIO TO POPULATION: 1966

Location	Resident population in thousands [1]	Number of nurses					Employed nurses per 100,000 population (adjusted)
		Total	Employed in nursing	Not employed in nursing	Activity status not reported	Employed in nursing (adjusted) [2]	
United States	195,936	909,131	593,694	285,791	29,646	613,188	313
Alabama	3,511	8,239	5,685	2,237	317	5,912	168
Alaska	265	873	581	279	13	590	223
Arizona	1,603	8,257	5,775	2,360	122	5,862	366
Arkansas	1,956	3,690	2,569	1,064	57	2,609	133
California	18,802	93,649	57,537	34,266	1,846	58,694	312
Colorado	1,955	10,964	8,208	2,619	137	8,312	425
Connecticut	2,878	20,393	14,973	4,805	615	15,438	536
Delaware	513	3,300	2,043	1,170	87	2,098	409
District of Columbia	806	4,332	3,604	709	69	3,662	454
Florida	5,893	28,760	21,007	6,757	996	21,760	369
Georgia	4,445	10,115	6,851	3,111	153	6,956	156
Hawaii	727	3,084	2,193	704	187	2,334	321
Idaho	697	3,049	1,946	1,090	13	1,954	280
Illinois	10,786	54,777	33,331	18,024	3,422	35,552	330
Indiana	4,951	17,999	12,307	4,959	733	12,829	259
Iowa	2,760	14,990	9,956	4,996	38	9,981	362
Kansas	2,275	10,532	6,558	3,459	515	6,895	303
Kentucky	3,181	9,048	6,130	2,678	240	6,297	198
Louisiana	3,617	9,180	6,598	2,364	218	6,758	187
Maine	978	6,410	3,963	2,308	139	4,051	414
Maryland	3,611	15,250	9,840	5,158	252	10,005	277
Massachusetts	5,403	45,731	25,729	15,207	4,795	28,743	532
Michigan	8,468	37,515	22,005	13,212	2,298	23,441	277
Minnesota	3,572	18,434	14,184	3,922	328	14,441	404
Mississippi	2,337	4,663	3,553	961	149	3,670	157
Missouri	4,564	14,566	11,021	3,197	348	11,291	247
Montana	702	3,404	2,471	916	17	2,483	354
Nebraska	1,459	7,308	4,674	2,547	87	4,730	329
Nevada	431	1,539	1,052	470	11	1,060	246
New Hampshire	676	5,402	3,381	1,806	215	3,521	521
New Jersey	6,899	42,479	24,283	17,074	1,122	24,942	362
New Mexico	1,002	3,619	2,482	1,095	42	2,511	251
New York	18,205	110,495	72,456	35,326	2,713	74,280	408
North Carolina	4,974	15,627	12,038	3,475	114	12,126	244
North Dakota	643	2,889	2,095	768	26	2,114	329
Ohio	10,364	45,572	32,239	12,761	572	32,649	315
Oklahoma	2,477	6,582	4,435	1,842	305	4,650	188
Oregon	1,973	9,302	6,647	2,428	228	6,814	345
Pennsylvania	11,601	75,353	43,382	27,978	3,993	45,809	395
Rhode Island	898	5,322	3,617	1,624	81	3,673	409
South Carolina	2,589	7,635	5,367	1,918	350	5,625	217
South Dakota	679	2,907	2,055	804	48	2,089	308
Tennessee	3,866	9,427	6,628	2,622	177	6,755	175
Texas	10,747	30,468	19,491	9,955	1,022	20,167	188
Utah	1,007	3,531	2,329	1,175	27	2,347	233
Vermont	411	2,813	1,796	955	62	1,836	447
Virginia	4,465	16,508	11,461	4,976	71	11,511	258
Washington	3,040	17,850	11,259	6,430	161	11,361	374
West Virginia	1,809	6,010	4,687	1,298	35	4,707	260
Wisconsin	4,167	17,623	14,018	3,522	83	14,084	338
Wyoming	319	1,621	1,204	410	7	1,209	379

[1] Total resident population as of July 1.

[2] Adjusted for activity status not reported.

Sources: American Nurses' Association Research and Statistics Department: *R.N.'s, 1966: An Inventory of Registered Nurses.* New York. American Nurses Association, 1969.

U.S. Bureau of the Census: Population estimates. *Current Population Reports.* Series P-25, No. 380, November 1967.

Table 95. LOCATION OF REGISTERED NURSES EMPLOYED IN HOSPITALS IN RELATION TO HOSPITAL BEDS: 1966

Location	Hospital beds	Registered nurses	R.N.'s per 1000 beds	Location	Hospital beds	Registered nurses	R.N.'s per 1000 beds
United States	1,678,658	[1] 360,969	215	Missouri	40,483	7,277	180
				Montana	4,383	1,547	353
Alabama	27,273	4,099	150	Nebraska	12,692	3,042	240
Alaska	2,006	563	281	Nevada	2,566	690	269
Arizona	9,256	2,932	317	New Hampshire	6,473	1,788	276
Arkansas	13,811	1,865	135	New Jersey	54,933	13,675	249
California	140,020	35,876	256	New Mexico	5,922	1,406	237
Colorado	15,877	4,685	295	New York	210,028	38,953	185
Connecticut	26,059	6,860	263	North Carolina	35,906	6,993	195
Delaware	6,109	1,077	176	North Dakota	6,340	1,241	196
District of Columbia	15,423	2,971	193	Ohio	81,456	18,275	224
Florida	39,053	10,295	264	Oklahoma	15,875	3,108	196
Georgia	31,935	4,792	150	Oregon	15,736	3,801	242
Hawaii	6,096	1,599	262	Pennsylvania	120,771	27,279	226
Idaho	3,727	998	268	Rhode Island	9,419	2,345	249
Illinois	106,906	23,569	220	South Carolina	17,937	3,193	178
Indiana	38,635	8,954	232	South Dakota	6,339	1,302	205
Iowa	20,454	5,584	273	Tennessee	31,899	4,473	140
Kansas	18,627	3,945	212	Texas	72,459	12,511	173
Kentucky	23,423	4,382	187	Utah	4,685	1,689	361
Louisiana	26,639	3,829	143	Vermont	4,894	1,205	246
Maine	9,630	2,250	234	Virginia	37,603	6,687	178
Maryland	33,476	6,767	202	Washington	19,077	6,015	315
Massachusetts	64,524	17,250	267	West Virginia	17,101	3,192	187
Michigan	73,702	13,526	184	Wisconsin	35,405	8,131	230
Minnesota	35,377	9,203	260	Wyoming	3,885	692	178
Mississippi	16,288	2,070	127				

[1] Estimates for 7,000 AHA registered hospitals based on 5,300 returns in PHS-AHA survey.

Sources: American Hospital Association: Hospitals Guide Issue, Part 2. *J.A.H.A.* Chicago, August 1967.

U.S. Department of Health, Education, and Welfare, Public Health Service, Bureau of Health Manpower and the American Hospital Association: *Manpower Resources in Hospitals—1966*. Chicago. American Hospital Association, 1967.

Table 96. LOCATION OF REGISTERED NURSES IN NURSING AND RELATED HOMES: 1967

Location	Beds in nursing and related homes	Registered nurses	R.N.'s per 1000 beds	Location	Beds in nursing and related homes	Registered nurses	R.N.'s per 1000 beds
United States	846,554	29,591	35.0	Missouri	22,860	491	21.5
				Montana	3,170	141	44.5
Alabama	8,806	282	32.0	Nebraska	11,560	211	18.3
Alaska	139	13	93.5	Nevada	749	18	24.0
Arizona	3,998	204	51.0	New Hampshire	4,021	244	60.7
Arkansas	10,478	210	20.0	New Jersey	22,888	1,257	54.9
California	85,105	2,813	33.1	New Mexico	1,964	83	42.3
Colorado	10,918	434	39.8	New York	60,341	3,281	54.4
Connecticut	15,924	1,292	81.1	North Carolina	14,181	330	23.3
Delaware	1,429	61	42.7	North Dakota	4,909	148	30.1
District of Columbia	2,071	52	25.1	Ohio	48,059	1,364	28.4
Florida	22,139	989	44.7	Oklahoma	19,374	288	14.9
Georgia	11,236	1,015	90.3	Oregon	13,518	377	27.9
Hawaii	1,327	97	73.1	Pennsylvania	47,331	1,851	39.1
Idaho	2,978	117	39.3	Rhode Island	4,876	189	38.8
Illinois	49,478	1,378	27.9	South Carolina	4,720	224	47.5
Indiana	21,929	646	29.5	South Dakota	5,198	301	57.9
Iowa	27,998	732	26.1	Tennessee	18,449	175	9.5
Kansas	17,372	348	20.0	Texas	43,988	700	15.9
Kentucky	11,841	218	18.4	Utah	3,777	74	19.6
Louisiana	10,313	411	39.9	Vermont	2,682	175	65.2
Maine	5,704	231	40.5	Virginia	10,062	301	29.9
Maryland	10,409	380	36.5	Washington	17,378	705	40.6
Massachusetts	38,604	1,727	44.7	West Virginia	2,186	74	33.9
Michigan	28,739	935	32.5	Wisconsin	25,793	929	36.0
Minnesota	28,837	955	33.1	Wyoming	982	26	26.5
Mississippi	3,766	94	25.0				

Source: National Center for Health Statistics, Division of Health Resources Statistics—data collected in the 1967 Master Facilities Inventory survey of inpatient health facilities.

Table 97. SCHOOLS OF NURSING—R.N. STUDENTS AND GRADUATES BY TYPE OF PROGRAM: 1955-56 THROUGH 1968-69

Academic year [1]	Schools	Students [2]	Graduates			
			Total	Diploma	Associate degree	Bachelor's degree
1968–69	1,287	145,588				
1967–68	1,262	141,948	41,555	28,197	6,213	7,145
1966–67	1,219	139,070	38,237	27,452	4,654	6,131
1965–66	1,191	135,702	35,125	26,278	3,349	5,498
1964–65	1,153	129,269	34,686	26,795	2,510	5,381
1963–64	1,142	124,744	35,259	28,238	1,962	5,059
1962–63	1,128	123,861	32,398	26,438	1,479	4,481
1961–62	1,118	123,012	31,186	25,727	1,159	4,300
1960–61	1,123	118,849	30,267	25,311	917	4,039
1959–60	1,119	115,057	30,113	25,188	789	4,136
1958–59	1,126	113,518	30,312	25,907	462	3,943
1957–58	1,118	112,989	30,410	26,314	425	3,671
1956–57	1,115	114,674	29,933	26,141	276	3,516
1955–56	1,125	114,423	30,236	26,828	252	3,156

[1] Includes Puerto Rico for all years, the Virgin Islands for 1965–66 through 1968–69. Includes Guam for 1966–67 through 1968–69.
[2] Fall enrollment at beginning of academic year.

Sources: American Nurses' Association: *Facts About Nursing: A Statistical Summary*. New York, 1969. Published annually.

National League for Nursing: *State-Approved Schools of Nursing—R.N.* New York, 1969. Published annually.

Table 98. LOCATION OF SCHOOLS OF NURSING—R.N., AND NUMBER OF STUDENTS AND GRADUATES: 1968

Location	Schools	Students [1]	Graduates [2]			
			Total	Diploma	Associate degree	Bachelor's degree
All locations	1,287	145,588	41,555	28,197	6,213	7,145
United States	1,272	144,024	41,245	27,950	6,163	7,132
Alabama	17	1,680	487	373	29	85
Alaska	1	8	—	—	—	—
Arizona	9	1,312	203	70	62	71
Arkansas	7	537	141	121	—	20
California	75	9,054	2,218	561	1,147	510
Colorado	12	1,379	326	168	40	118
Connecticut	20	2,539	785	625	43	117
Delaware	6	490	129	106	—	23
District of Columbia	6	869	213	127	—	86
Florida	24	2,981	915	329	415	171
Georgia	22	2,112	584	441	74	69
Hawaii	1	280	97	35	37	25
Idaho	5	315	102	16	76	10
Illinois	77	7,690	2,557	2,106	193	258
Indiana	28	3,387	1,085	578	271	236
Iowa	23	2,545	790	657	22	111

See footnotes at end of table.

Table 98. LOCATION OF SCHOOLS OF NURSING—R.N., AND NUMBER OF STUDENTS AND GRADUATES: 1968—Continued

Location	Schools	Students [1]	Graduates [2]			
			Total	Diploma	Associate degree	Bachelor's degree
Kansas	20	1,483	524	404	21	99
Kentucky	23	1,708	485	267	118	100
Louisiana	16	2,088	432	269	16	147
Maine	6	699	178	140	13	25
Maryland	26	3,087	855	559	62	234
Massachusetts	62	7,684	2,294	1,744	239	311
Michigan	41	6,007	1,753	1,120	330	303
Minnesota	28	4,076	1,262	764	193	305
Mississippi	15	827	239	96	126	17
Missouri	31	3,691	1,136	842	150	144
Montana	5	684	165	83	20	62
Nebraska	14	1,803	506	420	—	86
Nevada	2	234	38	—	19	19
New Hampshire	10	772	192	166	—	26
New Jersey	48	4,425	1,476	1,241	148	87
New Mexico	3	383	30	14	—	16
New York	138	17,167	4,928	2,994	1,070	864
North Carolina	39	3,268	850	541	126	183
North Dakota	10	928	241	165	—	76
Ohio	69	8,344	2,515	2,110	151	254
Oklahoma	12	837	204	113	32	59
Oregon	9	1,268	310	182	25	103
Pennsylvania	113	13,262	4,609	4,272	94	243
Rhode Island	8	1,243	292	205	21	66
South Carolina	9	1,144	294	157	94	43
South Dakota	9	1,154	294	156	55	83
Tennessee	23	2,152	540	367	57	116
Texas	46	5,047	930	518	95	317
Utah	6	678	226	57	98	71
Vermont	5	553	169	96	27	46
Virginia	32	2,572	779	517	79	183
Washington	19	2,480	569	183	175	211
West Virginia	16	1,252	363	253	53	57
Wisconsin	25	3,674	921	622	47	252
Wyoming	1	172	14	—	—	14
Guam	1	29	19	—	19	—
Puerto Rico	13	1,508	283	247	23	13
Virgin Islands	1	27	8	—	8	—

[1] As of October 15, 1968

[2] Academic year 1967–68.

Source: National League for Nursing: *State-Approved Schools of Nursing—R.N.* New York, 1969. Published annually.

Table 99. PRACTICAL NURSES IN RELATION TO POPULATION: SELECTED YEARS, 1950 THROUGH 1969

Year [1]	Resident population in thousands	Number of nurses in practice		Nurses per 100,000 population	Year [1]	Resident population in thousands	Number of nurses in practice		Nurses per 100,000 population
		Total	In A.H.A. registered hospitals				Total	In A.H.A. registered hospitals	
1969	200,985	345,000		172	1964	190,169	250,000	128,800	131
1968	199,017	320,000		161	1962	184,598	225,000	126,825	122
1967	196,858	300,000		152	1960	179,323	206,000		115
1966	194,899	282,000	151,000	145	1950	151,326	137,500	49,800	91

[1] Data for 50 States and the District of Columbia.

Sources: U.S. Public Health Service, Division of Nursing's estimates of practical nurses employed 1962–69. U.S. Bureau of the Census data for 1950 and 1960.

U.S. Bureau of the Census: Population estimates. *Current Population Reports.* Series P–25, No. 361, February 1967, No. 389, March 1968, and 417.

Table 100. LOCATION OF ACTIVE PRACTICAL NURSES IN RELATION TO POPULATION: 1960

Location	Resident population in thousands	Number of nurses [1]	Nurses per 100,000 population	Location	Resident population in thousands	Number of nurses [1]	Nurses per 100,000 population
United States	179,323	205,974	115	Missouri	4,320	5,862	136
				Montana	675	742	110
Alabama	3,267	3,617	111	Nebraska	1,411	1,895	134
Alaska	226	118	52	Nevada	285	242	85
Arizona	1,302	1,205	93	New Hampshire	607	922	152
Arkansas	1,786	2,010	113	New Jersey	6,067	4,870	80
California	15,717	18,619	118	New Mexico	951	770	81
Colorado	1,754	2,603	148	New York	16,782	15,191	91
Connecticut	2,535	2,800	110	North Carolina	4,556	3,967	87
Delaware	446	471	106	North Dakota	632	522	83
District of Columbia	764	1,749	229	Ohio	9,706	11,615	120
Florida	4,952	5,046	102	Oklahoma	2,328	3,838	165
Georgia	3,943	4,613	117	Oregon	1,769	2,656	150
Hawaii	633	952	150	Pennsylvania	11,319	13,125	116
Idaho	667	1,017	152	Rhode Island	859	1,118	130
Illinois	10,081	8,440	84	South Carolina	2,383	1,610	68
Indiana	4,662	3,896	84	South Dakota	681	605	89
Iowa	2,758	2,863	104	Tennessee	3,567	4,381	123
Kansas	2,179	2,527	116	Texas	9,580	13,386	140
Kentucky	3,038	2,775	91	Utah	891	801	90
Louisiana	3,257	3,521	108	Vermont	390	679	174
Maine	969	1,548	160	Virginia	2,967	3,960	100
Maryland	3,101	2,847	92	Washington	2,853	4,597	161
Massachusetts	5,149	11,339	220	West Virginia	1,860	1,892	102
Michigan	7,823	11,864	152	Wisconsin	3,952	3,503	89
Minnesota	3,414	3,948	116	Wyoming	330	245	74
Mississippi	2,178	2,592	119				

[1] Census data on employed practical nurses— the latest available by State.

Source: U.S. Bureau of the Census: *U. S. Census of Population: 1960. Detailed Characteristics: United States Summary.* Series PC(1)–1D to 52D. Washington. U.S. Government Printing Office, 1963.

Table 101. LOCATION OF LICENSED PRACTICAL NURSES EMPLOYED IN HOSPITALS: 1966

Location	Hospital beds	Licensed practical nurses	L.P.N.'s per 1000 beds	Location	Hospital beds	Licensed practical nurses	L.P.N.'s per 1000 beds
United States	1,678,658	[1] 150,569	89.7	Missouri	40,483	3,863	95.4
				Montana	4,388	401	91.4
Alabama	27,273	2,641	96.8	Nebraska	12,692	757	59.6
Alaska	2,006	169	84.2	Nevada	2,566	319	124.3
Arizona	9,256	1,049	113.3	New Hampshire	6,473	456	70.4
Arkansas	13,811	1,922	139.2	New Jersey	54,933	4,412	80.3
California	140,020	11,719	83.7	New Mexico	5,922	712	120.2
Colorado	15,877	1,688	106.3	New York	210,038	17,446	83.1
Connecticut	26,059	1,744	66.9	North Carolina	35,906	2,694	75.0
Delaware	6,109	311	50.9	North Dakota	6,340	484	76.3
District of Columbia	15,423	1,634	105.9	Ohio	81,456	7,909	97.1
Florida	39,053	4,388	112.4	Oklahoma	15,875	1,695	106.8
Georgia	31,935	2,387	74.7	Oregon	15,736	1,114	70.8
Hawaii	6,096	1,221	200.3	Pennsylvania	120,771	7,986	66.1
Idaho	3,727	897	240.7	Rhode Island	9,419	999	106.1
Illinois	106,906	6,393	59.8	South Carolina	17,937	1,349	75.2
Indiana	38,635	2,527	65.4	South Dakota	6,339	335	52.8
Iowa	20,454	1,311	64.1	Tennessee	31,899	4,040	126.6
Kansas	18,627	1,204	64.6	Texas	72,459	12,484	172.3
Kentucky	23,423	1,894	80.9	Utah	4,685	811	173.1
Louisiana	26,689	2,250	84.3	Vermont	4,894	492	100.5
Maine	9,630	419	43.5	Virginia	37,603	3,161	84.1
Maryland	33,476	2,852	85.2	Washington	19,077	3,108	162.9
Massachusetts	64,524	6,764	104.8	West Virginia	17,101	1,416	82.8
Michigan	73,702	6,905	93.7	Wisconsin	35,405	2,350	66.4
Minnesota	35,377	3,527	99.7	Wyoming	3,885	160	41.2
Mississippi	16,288	1,487	91.3				

[1] Estimates for 7,000 AHA registered hospitals based on 5,300 returns in PHS-AHA survey.

Sources: American Hospital Association: Hospitals Guide Issue. Part 2. *J.A.H.A.* Chicago. August 1967.

U.S. Department of Health, Education, and Welfare, Public Health Service, Bureau of Health Manpower and the American Hospital Association: *Manpower Resources in Hospitals—1966*. Chicago. American Hospital Association, 1967.

Table 102. LOCATION OF LICENSED PRACTICAL NURSES IN NURSING AND RELATED HOMES: 1967

Location	Beds in nursing and related homes	Licensed practical nurses	L.P.N.'s per 1000 beds	Location	Beds in nursing and related homes	Licensed practical nurses	L.P.N.'s per 1000 beds
United States	846,554	40,109	47.4	Missouri	22,860	833	36.4
				Montana	3,170	101	31.9
Alabama	8,806	831	94.4	Nebraska	11,560	222	19.2
Alaska	139	8	57.6	Nevada	749	31	41.4
Arizona	3,998	152	38.0	New Hampshire	4,021	197	49.0
Arkansas	10,478	362	34.5	New Jersey	22,888	950	41.5
California	85,105	3,270	38.4	New Mexico	1,964	110	56.0
Colorado	10,918	1,006	92.1	New York	60,341	3,492	57.9
Connecticut	15,924	842	52.9	North Carolina	14,181	522	36.8
Delaware	1,429	63	44.1	North Dakota	4,909	64	13.0
District of Columbia	2,071	230	111.1	Ohio	48,059	2,410	50.1
Florida	22,139	1,127	50.9	Oklahoma	19,374	532	27.5
Georgia	11,236	911	81.1	Oregon	13,518	247	18.3
Hawaii	1,327	49	36.9	Pennsylvania	47,331	4,542	96.0
Idaho	2,978	159	53.4	Rhode Island	4,876	273	56.0
Illinois	49,478	2,254	45.6	South Carolina	4,720	308	65.3
Indiana	21,929	676	30.8	South Dakota	5,198	90	17.3
Iowa	27,998	644	23.0	Tennessee	18,449	429	23.3
Kansas	17,372	307	17.7	Texas	43,988	2,913	66.2
Kentucky	11,841	354	29.9	Utah	3,777	158	41.8
Louisiana	10,313	618	59.9	Vermont	2,682	236	88.0
Maine	5,704	259	45.4	Virginia	10,062	484	48.1
Maryland	10,409	446	42.8	Washington	17,378	643	37.0
Massachusetts	38,604	2,988	77.4	West Virginia	2,186	102	46.7
Michigan	28,739	1,241	43.2	Wisconsin	25,793	538	20.9
Minnesota	28,837	664	23.0	Wyoming	982	25	25.5
Mississippi	3,766	196	52.0				

Source: National Center for Health Statistics, Division of Health Resources Statistics—data collected in the 1967 Master Facilities Inventory survey of inpatient health facilities.

Table 103. PROGRAMS OF PRACTICAL NURSE TRAINING, ADMISSIONS AND GRADUATES: 1953-54 THROUGH 1967-68

Academic Year [1]	Approved programs	Reporting programs	Admissions	Graduates	Academic Year [1]	Approved programs	Reporting programs	Admissions	Graduates
1967–68	1,191	1,145	45,076	30,833	1959–60	661	632	23,060	16,491
1966–67	1,149	1,130	41,269	27,644	1958–59	607	595	23,116	14,573
1965–66	1,081	1,018	38,755	25,688	1957–58	520	511	20,531	12,407
1964–65	984	941	36,489	24,331	1956–57	439	432	16,843	10,666
1963–64	913	881	34,131	22,761	1955–56	396	396	15,526	10,641
1962–63	851	810	30,585	19,621	1954–55	395	361	15,440	9,694
1961–62	739	707	26,660	18,106	1953–54	296	290	12,075	7,109
1960–61	693	660	24,995	16,635					

[1] Includes Samoa and the Virgin Islands for 1961–62 and succeeding years. Includes Puerto Rico for all years.

Sources: American Nurses' Association: *Facts About Nursing: A Statistical Summary*. New York, 1968. Also, prior annual issues.
National League of Nursing: *State-Approved Schools of Nursing—L.P.N./L.V.N.* New York, 1969.

Table 104. LOCATION OF PROGRAMS OF PRACTICAL NURSING AND NUMBER OF ADMISSIONS AND GRADUATES: 1967-68

Location	Approved programs	Admissions	Graduates	Location	Approved programs	Admissions	Graduates
All locations	1,191	45,076	30,833	Montana	5	88	92
				Nebraska	5	336	279
United States	1,174	44,541	30,294	Nevada	9	112	98
				New Hampshire	5	85	93
Alabama	29	882	636	New Jersey	33	1,087	771
Alaska	1	43	31	New Mexico	6	239	170
Arizona	11	412	267	New York	107	4,687	2,692
Arkansas	19	606	443	North Carolina	37	1,139	745
California	67	3,179	1,892	North Dakota	3	282	239
Colorado	13	447	300	Ohio	36	2,178	1,538
Connecticut	9	768	537	Oklahoma	16	454	300
Delaware	4	123	68	Oregon	13	349	278
District of Columbia	4	78	57	Pennsylvania	56	2,583	1,664
Florida	26	1,267	924	Rhode Island	3	193	159
Georgia	47	1,342	852	South Carolina	26	506	239
Hawaii	3	106	78	South Dakota	4	153	123
Idaho	14	161	154	Tennessee	13	1,154	910
Illinois	36	2,066	1,399	Texas	154	3,848	2,555
Indiana	18	781	501	Utah	4	222	128
Iowa	22	748	586	Vermont	3	122	94
Kansas	10	374	242	Virginia	44	996	684
Kentucky	15	424	305	Washington	24	973	745
Louisiana	23	806	557	West Virginia	13	468	327
Maine	5	160	121	Wisconsin	12	932	643
Maryland	26	537	349	Wyoming	2	24	43
Massachusetts	38	1,441	1,068				
Michigan	31	2,203	1,571	American Samoa	1	20	10
Minnesota	27	865	826	Puerto Rico	14	515	518
Mississippi	17	437	276	Virgin Islands	2	—	11
Missouri	26	1,075	645				

Source: National League for Nursing: *State-Approved Schools of Nursing—L.P.N/L.V.N.* New York, 1969. Published annually.

Table 105. LOCATION OF AIDES, ORDERLIES, AND ATTENDANTS EMPLOYED IN HOSPITALS IN RELATION TO POPULATION: 1966

Location	Number employed	Ratio per 100,000 population [1]	Location	Number employed	Ratio per 100,000 population [1]
United States	[1] 492,007	251	Missouri	12,539	275
			Montana	2,103	300
Alabama	6,846	195	Nebraska	5,200	361
Alaska	802	303	Nevada	628	146
Arizona	2,850	178	New Hampshire	1,754	259
Arkansas	3,086	158	New Jersey	13,988	203
California	46,216	246	New Mexico	2,375	237
Colorado	5,494	281	New York	66,203	364
Connecticut	7,096	247	North Carolina	9,371	188
Delaware	1,187	231	North Dakota	2,248	350
District of Columbia	3,958	491	Ohio	22,444	217
Florida	12,393	210	Oklahoma	6,551	264
Georgia	7,196	162	Oregon	4,605	233
Hawaii	637	88	Pennsylvania	24,860	214
Idaho	788	113	Rhode Island	2,622	292
Illinois	32,808	304	South Carolina	4,683	181
Indiana	14,458	292	South Dakota	1,971	290
Iowa	7,910	287	Tennessee	5,814	150
Kansas	7,568	333	Texas	20,335	189
Kentucky	7,332	230	Utah	1,600	159
Louisiana	8,013	222	Vermont	948	231
Maine	2,340	239	Virginia	10,806	242
Maryland	9,655	267	Washington	4,542	149
Massachusetts	14,536	269	West Virginia	4,774	264
Michigan	21,644	256	Wisconsin	12,180	292
Minnesota	9,988	280	Wyoming	1,073	336
Mississippi	4,133	177			

[1] Estimates for 7,000 AHA registered hospitals based on 5,300 returns in PHS-AHA survey.

Sources: U.S. Department of Health, Education, and Welfare, Public Health Service, Bureau of Health Manpower and the American Hospital Association: *Manpower Resources in Hospitals—1966*. Chicago. American Hospital Association, 1967.

U.S. Bureau of the Census: Population estimates. *Estimates of the Population of States, by Age 1960 to 1966*. Series P-25, No. 384, Feb. 1968.

Table 106. LOCATION OF AIDES, ORDERLIES, AND ATTENDANTS EMPLOYED IN HOSPITALS: 1966

Location	Hospital beds	Aides, orderlies, and attendants	Aides, orderlies, and attendants per 1000 beds	Location	Hospital beds	Aides, orderlies, and attendants	Aides, orderlies, and attendants per 1000 beds
United States	1,678,658	[1] 492,007	293	Missouri	40,483	12,539	310
				Montana	4,388	2,103	479
Alabama	27,273	6,846	251	Nebraska	12,692	5,200	410
Alaska	2,006	802	400	Nevada	2,566	628	245
Arizona	9,256	2,850	308	New Hampshire	6,473	1,754	271
Arkansas	13,811	3,086	223	New Jersey	54,933	13,988	255
California	140,020	46,216	330	New Mexico	5,922	2,375	401
Colorado	15,877	5,494	346	New York	210,038	66,203	315
Connecticut	26,059	7,096	272	North Carolina	35,906	9,371	261
Delaware	6,109	1,187	194	North Dakota	6,340	2,248	355
District of Columbia	15,423	3,958	257	Ohio	81,456	22,444	276
Florida	39,053	12,393	317	Oklahoma	15,875	6,551	413
Georgia	31,935	7,196	225	Oregon	15,736	4,605	293
Hawaii	6,096	637	104	Pennsylvania	120,771	24,860	206
Idaho	3,727	788	211	Rhode Island	9,419	2,622	278
Illinois	106,906	32,808	307	South Carolina	17,937	4,683	261
Indiana	38,635	14,458	374	South Dakota	6,339	1,971	311
Iowa	20,454	7,910	387	Tennessee	31,899	5,814	182
Kansas	18,627	7,568	406	Texas	72,459	20,335	281
Kentucky	23,423	7,332	313	Utah	4,685	1,600	342
Louisiana	26,689	8,013	300	Vermont	4,894	948	194
Maine	9,630	2,340	243	Virginia	37,603	10,806	287
Maryland	33,476	9,655	288	Washington	19,077	4,542	238
Massachusetts	64,524	14,526	225	West Virginia	17,101	4,774	279
Michigan	73,702	21,644	294	Wisconsin	35,405	12,180	344
Minnesota	35,377	9,988	282	Wyoming	3,885	1,073	276
Mississippi	16,288	4,133	254				

[1] Estimates for 7,000 AHA registered hospitals based on 5,300 returns in PHS-AHA survey.

Sources: American Hospital Association: *Hospitals Guide Issue*, Part 2. *J.A.H.A.* Chicago, August 1967.

U.S. Department of Health, Education, and Welfare, Public Health Service, Bureau of Health Manpower and the American Hospital Association: *Manpower Resources in Hospitals—1966*. Chicago. American Hospital Association, 1967.

CHAPTER 21

Occupational Therapy

Occupational therapy is the art and science of using purposeful activity in the promotion and maintenance of health, the prevention of disability, and as treatment in the rehabilitation of persons with physical or emotional dysfunction. The occupational therapist, as a vital member of the rehabilitation team, determines the objectives of the treatment program according to the individual needs of each patient. This may include decreasing disability during the patient's initial phases of recovery following injury or illness, increasing the individual's capability for independence and improving his physical, emotional, and social well-being, and developing his total function to a maximum level through early evaluation and experimentation for future job training and employment.

The number of persons employed as registered *occupational therapists* increased from about 2,000 in 1950 to more than 6,700 in 1969. There were 8,600 registered occupational therapists in February 1969. Of these, an estimated 2,000 were not in practice (tables 107 and 108). About two-thirds of the occupational therapists work in hospitals, with large numbers in Federal installations. Others are employed in nursing homes and homes for the aged, rehabilitation centers, schools and camps for handicapped children, community health agencies, and educational and research insitutions.

As of October, 1968, thirty-two colleges and universities offered AMA-AOTA approved programs leading to professional qualification in occupational therapy under three plans of education: 32 have a minimum 4-year bachelor's degree course for high school graduates and transfer students, nine have a minimum one and one-half year certificate course for students who hold a bachelor's degree in other than occupational therapy, and seven have a 2-year graduate program leading to a master's degree for students with bachelor's degrees and the requisite background. In the fall of 1968 a total of 726 seniors and post-baccalaureate students were enrolled in their final academic year and 521 students were enrolled in clinical practice. During the calendar year 1968, 550 were graduated as occupational therapists (tables 109 and 110). An increased number of graduates are anticipated in the near future due to expanded university enrollment, and to new programs in occupational therapy now awaiting accreditation at four colleges and universities.

In addition to the academic work, a minimum of 6 months of supervised clinical practice in health facilities or agencies is required to complete professional education and to qualify for admission to the national examination conducted by the American Occupational Therapy Association for professional registration.

The occupational therapist may have the help of an *occupational therapy technician*—usually known as an *occupational therapy assistant*—in carrying out the program of rehabilitating patients in hospitals and other health care facilities. The assistant's duties include direct participation in the patient's activities. It is estimated that there are between 4,500 and 5,500 occupational therapy assistants currently employed, of whom about 1,500 have met the requirements for certification by the American Occupational Therapy Association, Inc.

Twenty-eight occupational therapy assistant training programs for high school graduates were in operation at the close of 1968 (table 111). They are conducted by hospitals, health agencies, vocational and adult education schools, and community colleges. Graduates are eligible for certification as occupational therapy assistants and for membership in the American Occupational Therapy Association. As of December 31, 1968, certified occupational therapy assistants in good standing included 924 graduates of such programs and 366 who were qualified under a terminated "grandfather clause."

Trained volunteers also play an important part in occupational therapy services. Professional artists, musicians, and others lend their abilities and special talents to assist the therapist in providing a well-rounded program for patients.

Table 107. NUMBER OF REGISTERED OCCUPATIONAL THERAPISTS: SELECTED YEARS 1950 THROUGH 1969

Year	Number of registered [1] occupational therapists		Year	Number of registered [1] occupational therapists	
	Total [2]	Active (estimated)		Total [2]	Active (estimated)
1969	8,564	6,700	1960	5,697	6,300
1967	8,300	6,500	1955	4,495	3,700
1966	7,728	6,300	1950	3,372	2,000
1965	7,390	6,000			

[1] Persons who have passed the national examination conducted by the American Occupational Therapy Association, Inc.

[2] Includes occupational therapists in 50 states, the District of Columbia, Puerto Rico, Armed Forces overseas, and foreign.

Sources: Bureau of Health Professions Education and Manpower Training: *Health Manpower Source Book 20*. PHS Pub. No. 263 Section 20. National Institutes of Health, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969.

American Occupational Therapy Association, Inc.

Table 108. LOCATION OF REGISTERED OCCUPATIONAL THERAPISTS: FEBRUARY, 1969

Location [1]	Number of OTR's	Location [1]	Number of OTR's
All locations	[2] 8,564	Missouri	162
		Montana	19
United States	8,369	Nebraska	39
		Nevada	11
Alabama	25	New Hampshire	65
Alaska	7	New Jersey	235
Arizona	66	New Mexico	37
Arkansas	21	New York	885
California	1,374	North Carolina	74
Colorado	235	North Dakota	34
Connecticut	185	Ohio	307
Delaware	26	Oklahoma	28
District of Columbia	86	Oregon	76
Florida	173	Pennsylvania	371
Georgia	63	Rhode Island	24
Hawaii	92	South Carolina	23
Idaho	15	South Dakota	21
Illinois	464	Tennessee	39
Indiana	151	Texas	282
Iowa	77	Utah	15
Kansas	119	Vermont	18
Kentucky	47	Virginia	184
Louisiana	34	Washington	226
Maine	35	West Virginia	15
Maryland	172	Wisconsin	456
Massachusetts	377	Wyoming	3
Michigan	536		
Minnesota	326	Puerto Rico	56
Mississippi	14	Foreign	139

[1] Based on mailing addresses of living registered occupational therapists.

[2] Probably 2,000 or more are not in practice based on the 1965 AOTA membership.

Source: American Occupational Therapy Association, Inc.

Table 109. SCHOOLS OFFERING ACCREDITED COURSES IN OCCUPATIONAL THERAPY, STUDENTS AND GRADUATES: 1960-61 THROUGH 1968-69.

Academic year	Schools	Seniors and postbaccalaureate students [1]	Students in clinical practice [2]	Graduates [3]	Academic year	Schools	Seniors and postbaccalaureate students [1]	Students in clinical practice [2]	Graduates [3]
1968-69	32	726	521	----	1963-64	32	578	407	438
1967-68	32	696	469	550	1962-63	31	501	332	364
1966-67	32	615	476	536	1961-62	31	439	270	302
1965-66	32	602	438	485	1960-61	31	372	329	367
1964-65	32	537	491	505					

[1] October enrollment of undergraduate students in 4th year of O.T. degree program and 5th or 6th year for students with degree in other than O.T.

[2] October enrollment in internship following 4th year for degree students and 5th year for post-degree students.

[3] Calendar year data are for graduates with at least 4 years of academic education and a period of clinical practice which qualified them for professional registration upon successful completion of the national examination conducted by the American Occupational Therapy Association, Inc.

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.

American Occupational Therapy Association, Inc.

Table 110. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING ACCREDITED COURSES IN OCCUPATIONAL THERAPY AND NUMBER OF STUDENTS AND GRADUATES: 1968

Location	School	Ownership	Seniors and postbaccalaureate students [1] (1968-69)	Students in clinical practice [2] (1968-69)	Graduates [3] (1968)
	Total, 32 schools [4]	----	726	521	550
Calif	Loma Linda University, Loma Linda	Private	9	5	9
	San Jose State College, San Jose	Public	[5,6] 78	38	36
	University of Southern California, Los Angeles	Private	[5] 21	15	17
Colo	Colorado State University, Fort Collins	Public	[6] 47	29	13
Fla	University of Florida, College of Health Related Professions, Gainesville.	do	31	11	22
Ill	University of Illinois, College of Medicine, Chicago	do	—	44	13
Ind	Indiana University, School of Medicine, Indianapolis.	do	12	—	14
Iowa	University of Iowa, Iowa City	do	12	18	12
Kans	University of Kansas, Lawrence	do	20	24	14
Mass	Boston University, Sargent College of Allied Health Professions, Boston.	Private	[6] 31	17	16
	Tufts University, Boston School of Occupational Therapy, Boston.	do	4	25	29
Mich	Eastern Michigan University, Ypsilanti	Public	28	16	19
	Wayne State University, School of Medicine, Detroit.	do	[6] 24	12	16
	Western Michigan University, Kalamazoo	do	[5] 39	39	30
Minn	College of St. Catherine, St. Paul	Private	26	21	22
	University of Minnesota, College of Medical Sciences, Minneapolis.	Public	20	—	20
Mo	Washington University, School of Medicine, St. Louis.	Private	17	—	11
N.H	University of New Hampshire, Durham	Public	11	14	20

See footnotes at end of table.

Table 110. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING ACCREDITED COURSES IN OCCUPATIONAL THERAPY AND NUMBER OF STUDENTS AND GRADUATES: 1968—Con.

Location	School	Ownership	Seniors and post-baccalaureate students [1] (1968–69)	Students in clinical practice [2] (1968–69)	Graduates [3] (1969)
N.Y.	Columbia University, College of Physicians and Surgeons, New York.	Private	[5] 28	28	20
	New York University, School of Education, New York.	do	[6] 21	9	10
	State University of New York at Buffalo, Buffalo	Public	[5] 30	13	12
N.Dak	University of North Dakota, Grand Forks	do	11	11	12
Ohio	Ohio State University, College of Medicine, Columbus.	do	16	15	28
Pa.	Temple University, College of Allied Health Professions, Philadelphia.	do	8	—	—
	University of Pennsylvania, School of Allied Medical Professions, Philadelphia.	Private	[6] 18	18	23
Tex.	Texas Woman's University, Denton	Public	[5,6] 23	15	24
Va.	Virginia Commonwealth University, School of Occupational Therapy, Richmond.	do	[5,6] 36	25	22
Wash.	University of Puget Sound, School of Occupational Therapy, Tacoma.	Private	[6] 25	16	15
	University of Washington, School of Medicine, Seattle.	Public	19	8	10
Wis.	Mount Mary College, Milwaukee	Private	18	16	17
	University of Wisconsin, Madison	Public	27	18	12
P.R.	University of Puerto Rico, School of Medicine, School of Physical and Occupational Therapy, Rio Piedras.	do	16	1	12

[1] October 1968 enrollment of undergraduate students in 4th year of O. T. degree program and 5th or 6th year for students with degree in other than O.T.

[2] October 1968 enrollment in internship following 4th year for degree students and 5th year for post-degree students.

[3] Calendar year 1968 data on graduates with at least 4 years of academic education and a period of clinical practice which qualifies them for professional registration upon successful completion of the national examination conducted by the American Occupational Therapy Association, Inc.

[4] Awaiting accreditation of new baccalaureate degree programs: Ala., University of Alabama at Birmingham; N.Y., State University of New York—Downstate Medical Center, Brooklyn; Utica College of Syracuse University, Utica; Tex., University of Texas—Medical Branch, Galveston.

[5] Bachelor's and master's degree programs offered.

[6] Offers both a baccalaureate degree program, and a certificate program for students with a bachelor's degree in other than O.T.

Source: American Occupational Therapy Association, Inc.

Table 111. LOCATION AND OWNERSHIP OF TRAINING PROGRAMS FOR OCCUPATIONAL THERAPY ASSISTANTS, TYPE OF PROGRAM, AND NUMBER OF GRADUATES: 1968

Location	Sponsoring agency or institution [1]	Ownership	Type of program	Graduates
	Total, 28 programs			218
Calif.	Los Angeles City College, Los Angeles [2]	Public	Combined program, all areas	—
	Southwestern College, Chula Vista [2]	do	do	—
Colo.	Colorado State Hospital, Pueblo	do	do	—
Conn.	Hartford Hospital, Department of Psychiatry, Occupational Assistant Training Program, Hartford.	Private	do	11
Iowa	Area Ten Community College, Cedar Rapids	Public	do	—
Md.	Maryland State Department of Health, Program for Occupational Therapy Assistants, Baltimore.	do	do	17
	Naval Medical School, National Naval Medical Center, Bethesda. [3]	do	do	—
Mass.	Massachusetts Department of Mental Health, Boston State Hospital, Boston.	do	Psychiatry	—
Mich.	Schoolcraft College, Livonia [2]	do	Combined program, all areas	—
Minn.	Occupational Therapy Assistants School, Board of Education of the City of Duluth.	do	General practice	13
	St. Mary's Junior College, Minneapolis [2]	Private	Combined program, all areas	14
	Technical Education Center, Anoka [2]	Public	do	—
N.H.	New England O.T. Assn. & New Hampshire Social Welfare Council, Concord. [2]	do	do	—
N.Y.	Erie County Technical Institute, Buffalo	do	do	—
	Marcy State Hospital, Marcy	do	Psychiatry	—
	New York Medical College Center for Chronic Disease, Bird S. Coler Hospital, New York.	do	Combined program, all areas	29
	Rockland State Hospital, Orangeburg	do	Psychiatry	12
Ohio	Department of Adult Education, Public Schools, Columbus.	do	Combined program, all areas	15
Oreg.	Mount Hood Community College, Gresham [2]	do	do	15
Pa.	Mount Aloysius Junior College, Cresson	Private	General practice	13
Tenn.	Adult Vocational Education, City Schools, Murfreesboro.	Public	Combined program, all areas	10
Texas	Houston Health Department, Chronic Illness Control Division, Houston.	do	do	9
Va.	Virginia Program for Occupational Therapy Assistants, Center for Continuing Education, Richmond Professional Institute, Richmond.	do	do	—
Wash.	Green River Community College, Auburn [2]	do	do	—
Wis.	Madison Vocational, Technical, and Adult Schools, Area Technical College, Madison [2]	do	do	8
	Wisconsin Department of Mental Hygiene, Madison.	do	Psychiatry	31
P.R.	Department of Health, Gericulture Commission, San Juan.	do	Combined program, all areas	21
	Humacao Regional College of University Puerto Rico, Humacao. [2]	do	do	—

[1] Programs endorsed by American Occupational Therapy Association, Inc.

[2] Surveyed in Spring of 1968, awaiting approval.

[3] Enrollment of military personnel only.

Source: American Occupational Therapy Association, Inc.

CHAPTER 22

Optometry, Opticianry, and Other Ocular Services

Several categories of health or health-related personnel are involved in providing services for the relief of visual or ocular complaints. These include ophthalmologists, optometrists, dispensing opticians, optical technicians, ophthalmic assistants, and orthoptists. Since ophthalmologists are physicians, their data are included in Chapter 18, Medicine and Osteopathy.[1] Optometrists, dispensing opticians, optical technicians, ophthalmic assistants, and orthoptists are discussed in this chapter.

Optometrists examine the eyes and related structures to determine the presence of vision problems, eye diseases, or other abnormalities. They prescribe and adapt lenses or other optical aids and may use visual training aids, when indicated, to preserve or restore maximum efficiency of vision. They do not prescribe drugs, diagnose or treat eye diseases, or perform surgery.

Dispensing opticians make, fit, and adjust eyeglasses according to prescriptions written by ophthalmologists or optometrists to correct a patient's optical defects. They do not examine eyes or prescribe treatment. Mechanical grinding and polishing of the lenses and assembling in a frame are done by optical technicians who follow the work order prepared by the dispensing optician.

Many ophthalmologists are assisted in their offices by ophthalmic assistants. Ophthalmic assistants take histories, test visual acuities, make visual field examinations, perform tonography, assist in refractions, administer local medications, apply surgical dressings, neutralize lenses, fit and adjust spectacles, and test for binocular vision. A special category of ophthalmic assistants are orthoptists. Orthoptists work under the direction of the ophthalmologist in the specialized field of teaching patients certain exercises which help to overcome the handicap of crossed eyes, or in other patients, train eyes which are not working well as a pair to work together efficiently.

Statistics collected by the National Center for Health Statistics on assistants serving ophthalmologists and optometrists will be published in 1970. Optometrists, secretaries, receptionists and assistants are discussed in Chapter 29, Secretarial and Office Services.

Optometrists

The number of *optometrists* in the United States has been relatively constant for many years (table 112). In 1968, there were an estimated 18,000 active optometrists. The State distribution of these active optometrists is presented in table 113. Survey data showed that approximately 85 percent were self-employed and 15 percent were employees (table 114) (47).

All States and the District of Columbia require a license for the practice of optometry. To qualify for a license, the applicant must be a graduate of an accredited school of optometry and pass a State board examination. In addition, Alabama requires a 3-month internship, Delaware and Rhode Island a 6-month internship, and Mississippi requires 1 year.

All 11 accredited colleges of optometry in the United States require a 6-year curriculum leading to a Doctor of Optometry degree (O.D.), which includes 2 years of preoptometry education at an accredited college and 4 years at a school of optometry.

In 1968–69, the 10 accredited schools then in operation enrolled 2,238 students and graduated 461 optometrists. The University of Alabama at Birmingham, School of Optometry enrolled its first students in the fall of 1969 (tab[illegible]15 and 116).

Dispensing Opticians and Optical Technicians

Approximately 10,000 *dispensing opticians* were active throughout the country in 1968. Of these,

[1] Ophthalmologists (oculists) are physicians who specialize in the diagnosis and treatment of all eye diseases and abnormal conditions including refractive errors. They may prescribe drugs, lenses, or other treatment, or perform surgery to remedy these conditions.

nearly 6,000 were employed in retail optical shops. In addition, about 3,000 were proprietors of retail optical shops, over 500 were employed by optometrists, and the remaining 500 were employed in wholesale laboratories or by manufacturers, hospitals, government, or other industries (*48*).

The Guild of Prescription Opticians of America, Inc. (615 member firms) estimates that probably upwards of 15,000 *optical technicians* were employed throughout the country in 1968. Of these, more than 10,000 were employed in prescription departments of optical laboratories or by manufacturers of ophthalmic goods. Probably as many as 4,000 were employed in retail optical shops, and fewer than 1 000 by optometrists.

According to the Bureau of the Census, the total number of persons employed as either dispensing opticians or optical technicians was 19,200 in 1950 and 20,300 in 1960 (table 117).

Dispensing opticians are required to have a license in 15 States. In addition, California and Hawaii license opticianry establishments. In both Connecticut and New Jersey, a license is required for optical technicians.

An apprenticeship of 1 to 4 years is required to practice opticianry in most licensing States. Six States also specify high school graduation. Qualifications for initial licensure usually include successful completion of written, oral, and practical examinations. An alternate method of entering this occupation is through completion of a 1-or 2-year formal program in ophthalmic dispensing or optical technology in a community college, or in a military or technical school. Five of the six schools which grant associate degrees or certificates in ophthalmic dispensing have been certified by the American Board of Opticianry (table 118).

Ophthalmic Assistants

The American Association of Ophthalmology estimates there were over 10,000 persons employed as *ophthalmic assistants* in 1968. The Association maintains a voluntary registry, the American Registry of Ophthalmic Medical Assistants, established in 1958. Requirement for registration is a statement of education, skills, and duties and endorsement of competence in these areas by the employer.

In 1967 the American Association of Ophthalmology established a 2-year Home Study Course for Ophthalmic Medical Assistants. In the latter part of 1969 approximately 5,700 persons were registered in or had completed the course.

Orthoptists

According to the American Orthoptic Council there were approximately 450 *orthoptists* employed in 1968. The great majority work in the private offices of ophthalmologists, while a few are employed in hospitals and clinics.

The American Orthoptic Council is the regulating board for orthoptists. The Council administers the national board examination which is required for certification. To qualify to take the examination, a person needs 2 years of college and 15 months of training in one of the 13 accredited training centers or 22 preceptorships (table 119). A preceptorship is a minimum of 13 months of practical training under the supervision of a certified orthoptist following 2 months in the basic course offered by the American Orthoptic Council. A certificate is issued by the Council to qualified students who successfully pass an examination conducted by the Council. The American Association of Certified Orthoptists had 415 members in 1969.

REFERENCES

(*47*) Unpublished data from the 1968 National Center for Health Statistics survey of optometrists.
(*48*) Unpublished data from the 1969 National Center for Health Statistics survey of opticians.

Table 112. OPTOMETRISTS IN RELATION TO POPULATION: SELECTED YEARS, 1950 THROUGH 1968

Year	Population in thousands[1]	Optometrists[2]	Optometrists per 100,000 population	Year	Population in thousands[1]	Optometrists[2]	Optometrists per 100,000 population
1968	200,832	20,660	10	1964	191,372	20,818	11
1967	198,852	20,565	10	1960	179,992	21,824	12
1966	195,208	20,610	11	1950	151,234	20,792	14

[1] Includes civilians and armed forces in 50 States and the District of Columbia for 1960-67. Excludes Hawaii and Alaska for 1950. As of December for 1967-68. As of March for 1966. As of July 1 for 1950-64.
[2] Active and inactive optometrists.

Sources: *The Blue Book of Optometrists*. Chicago. Professional Press, Inc., 1968. Also, prior biennial editions of this directory.

National Center for Health Statistics, Division of Health Resources Statistics—data collected in the 1968 Vision and Eye Care Manpower Survey, Survey of Optometrists, September to December 1968.

U.S. Bureau of the Census: Population estimates. *Current Population Reports*. Series P-25, No. 229, May 1961, and No. 422, May 1969.

Table 113. LOCATION OF ACTIVE OPTOMETRISTS IN RELATION TO POPULATION: 1968

Location	Civilian population in thousands July 1	Optometrists	Optometrists per 100,000 population	Location	Civilian population in thousands July 1	Optometrists	Optometrists per 100,000 population
United States	197,571	[1] 18,000	9	Missouri	4,583	414	9
				Montana	686	85	12
Alabama	3,522	163	5	Nebraska	1,424	150	11
Alaska	241	17	7	Nevada	439	35	8
Arizona	1,631	118	7	New Hampshire	699	68	10
Arkansas	1,976	141	7	New Jersey	7,020	628	9
California	18,918	2,138	11	New Mexico	990	71	7
Colorado	1,986	184	9	New York	18,040	1,446	8
Connecticut	2,951	261	9	North Carolina	5,096	308	6
Delaware	525	31	6	North Dakota	614	68	11
District of Columbia	790	61	8	Ohio	10,564	908	9
Florida	6,048	480	8	Oklahoma	2,475	238	10
Georgia	4,452	257	6	Oregon	2,003	266	13
Hawaii	727	63	9	Pennsylvania	11,709	1,056	9
Idaho	699	80	11	Rhode Island	883	121	14
Illinois	10,934	1,440	13	South Carolina	2,584	150	6
Indiana	5,051	487	10	South Dakota	651	92	14
Iowa	2,771	322	12	Tennessee	3,940	289	7
Kansas	2,262	223	10	Texas	10,784	713	7
Kentucky	3,160	221	7	Utah	1,029	64	6
Louisiana	3,678	205	6	Vermont	424	37	9
Maine	963	113	12	Virginia	4,412	257	6
Maryland	3,677	165	4	Washington	3,204	341	11
Massachusetts	5,431	682	13	West Virginia	1,801	144	8
Michigan	8,720	678	8	Wisconsin	4,218	410	10
Minnesota	3,642	343	9	Wyoming	311	37	12
Mississippi	2,321	120	5				

[1] Includes 611 optometrists in military service not allocated by State.

Sources: National Center for Health Statistics, Division of Health Resources Statistics—data collected in the 1968 Vision and Eye Care Manpower Survey; Survey of Optometrists, September to December 1968.

U.S. Bureau of the Census: Population estimates. *Current Population Reports*. Series P-25, No. 414, January 1969.

Table 114. PRINCIPAL FORM OF EMPLOYMENT OF OPTOMETRISTS: 1968

Type of practice	Optometrists	
	Number [1]	Percent
All active optometrists	18,000	100.0
Total self-employed	15,300	85.0
Solo practice	12,700	70.5
Partnership practice	2,100	11.7
Group practice	500	2.8
Total employees	2,700	15.0
Employed by:		
Government	50	0.3
Optometrist(s)	900	5.1
Ophthalmologist(s)	100	0.5
Physician(s) other than ophthalmologists	50	0.3
Firm or corporation (proprietary)	600	3.3
Nonprofit organization or institution	200	1.1
Military, or status not reported	800	4.4

[1] Estimated.

Source: National Center for Health Statistics, Division of Health Resources Statistics—data collected in the 1968 Vision and Eye Care Manpower Survey; Survey of Optometrists, September to December 1968.

Table 115. SCHOOLS OF OPTOMETRY, STUDENTS AND GRADUATES: SELECTED YEARS, 1950-51 THROUGH 1968-69

Academic year	Schools	Students [1]	Graduates	Academic year	Schools	Students [1]	Graduates
1968–69	10	2,238	461	1961–62	10	1,180	299
1967–68	10	1,994	464	1960–61	10	1,101	316
1966–67	10	1,876	484	1959–60	10	1,122	364
1965–66	10	1,741	384	1956–57	10	1,175	355
1964–65	10	1,582	406	1953–54	12	1,631	674
1963–64	10	1,364	346	1950–51	10	2,435	961
1962–63	10	1,263	359				

[1] Fall enrollment of undergraduate students.

Source: American Optometric Association.

Table 116. LOCATION AND OWNERSHIP OF ACCREDITED SCHOOLS OF OPTOMETRY AND NUMBER OF STUDENTS AND GRADUATES: 1968–69

Location	School	Ownership	Students [1]	Graduates
	Total, 10 schools		2,238	461
Calif.	Los Angeles College of Optometry, Los Angeles	Private	171	[2]
	University of California School of Optometry, Berkeley	Public	151	[2]
Ill.	Illinois College of Optometry, Chicago	Private	288	112
Ind.	Indiana University, Division of Optometry, Bloomington	Public	168	33
Mass.	Massachusetts College of Optometry, Boston	Private	163	40
Ohio	Ohio State University School of Optometry, Columbus	Public	182	34
Oreg.	Pacific University College of Optometry, Forest Grove	Private	192	14
Pa.	Pennsylvania College of Optometry, Philadelphia	do	400	86
Tenn.	Southern College of Optometry, Memphis	do	318	96
Tex.	University of Houston College of Optometry, Houston	Public	205	46

[1] Fall enrollment in 1968.

[2] No graduates due to change from 3-to 4-year program.

Source: American Optometric Association.

Table 117. LOCATION OF DISPENSING OPTICIANS AND OPTICAL TECHNICIANS IN RELATION TO POPULATION: APRIL 1, 1960

Location	Number employed	Ratio per 100,000 population	Location	Number employed	Ratio per 100,000 population
United States	[1] 20,349	11	Missouri	521	12
			Montana	72	11
Alabama	154	5	Nebraska	177	13
Alaska	24	11	Nevada	16	6
Arizona	98	8	New Hampshire	123	20
Arkansas	53	3	New Jersey	657	11
California	1,614	10	New Mexico	64	7
Colorado	228	13	New York	3,722	22
Connecticut	370	15	North Carolina	269	6
Delaware	36	8	North Dakota	53	8
District of Columbia	64	8	Ohio	981	10
Florida	510	10	Oklahoma	169	7
Georgia	23[illegible]	6	Oregon	177	10
Hawaii	61	10	Pennsylvania	1,364	12
Idaho	22	3	Rhode Island	229	27
Illinois	1,213	12	South Carolina	116	5
Indiana	356	8	South Dakota	52	8
Iowa	213	8	Tennessee	168	5
Kansas	209	10	Texas	1,010	11
Kentucky	225	7	Utah	124	14
Louisiana	171	5	Vermont	49	13
Maine	31	3	Virginia	550	14
Maryland	358	12	Washington	304	11
Massachusetts	1,428	28	West Virginia	148	8
Michigan	629	8	Wisconsin	361	9
Minnesota	488	14	Wyoming	8	2
Mississippi	74	3			

[1] Many of the 2,500 proprietors of retail optical establishments were also trained as dispensing opticians or optical technicians (lens grinders and polishers and other laboratory mechanics).

Source: Prindle, R. A., and Pennell, M. Y.: Industry and occupation data from the 1960 census. *Health Manpower Source Book 17*. PHS Pub. No. 263, Section 17. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1963.

Table 118. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING TRAINING PROGRAMS FOR OPTICIANS AND NUMBER OF GRADUATES: JUNE 1969

Location	Institution	Ownership	Graduates
	Total, 6 institutions		65
Calif.	Los Angeles City College, Los Angeles	Public	
Mass.	Worcester Industrial Technical Institute, Worcester	do	8
Mich.	Ferris State College, Technical Terminal Division, Big Rapids	do	8
Minn.	Eveleth Area Vocational-Technical School, Eveleth [1]	do	
N.Y.	City University of New York, New York City Community College of Applied Arts and Sciences, New York City.	do	12
	Erie Community College, Optical Technology Department, Buffalo	do	37

[1] Not listed by the A.B.O. accrediting body.

Source: American Board of Opticianry.

Table 119. LOCATION AND OWNERSHIP OF ACCREDITED TRAINING CENTERS AND PRECEPTORSHIPS IN ORTHOPTICS AND NUMBER OF STUDENTS: JULY 1969

Location	Center or preceptorship	Ownership	Students
	13 training centers		36
Ga.	Emory University Orthoptic Training School, Emory University Clinic, Atlanta.	Private	3
Ind.	Indiana University, Department of Ophthalmology, Indianapolis	Public	2
La.	Tulane University School of Medicine, Orthoptic-Pleoptic Clinic, Department of Ophthalmology, New Orleans.	Private	3
Mass.	Harvard Medical School, Massachusetts Eye and Ear Infirmary, Boston	do	2
Mich.	Wayne State University School of Medicine, Kresge Eye Institute, Detroit.	Public-private	2
Mo.	St. Louis Eye Clinic, St. Ann	Private	2
	University of Missouri School of Medicine, Section of Ophthalmology, Columbia.	Public	2
N.Y.	New York Eye and Ear Infirmary, School of Orthoptics, New York	Private	8
	New York University School of Medicine, Department of Ophthalmology, New York.	do	3
Ohio	Ohio State University Hospitals, Department of Ophthalmology, Columbus.	Public	1
Okla.	University of Oklahoma Medical Center, Orthoptic Clinic, Oklahoma City.	do	2
Pa.	Wills Eye Hospital, Philadelphia	Private	2
Tex.	Baylor University College of Medicine, Department of Ophthalmology, Methodist Hospital, Pleoptic-Orthoptic Unit, Houston.	do	4
	22 preceptorships		34
Calif.	University of California San Francisco Medical Center, University of California Hospital, San Francisco.	Public	1
Colo.	University of Colorado Medical Center, Department of Ophthalmology, Denver.	Private	1

Table 119. LOCATION AND OWNERSHIP OF ACCREDITED TRAINING CENTERS AND PRECEPTORSHIPS IN ORTHOPTICS AND NUMBER OF STUDENTS: JULY 1969—Continued

Location	Center or preceptorship	Ownership	Students
Fla	St. Joseph's Hospital, Ophthalmic Laboratory, Tampa	Private	3
	University of Florida College of Medicine, Department of Ophthalmology, Gainesville.	Public	1
	University of Miami School of Medicine, Bascon Palmer Eye Institute, Miami.	Private	2
Iowa	University of Iowa, University Hospitals, Department of Ophthalmology, Iowa City.	Public	3
Mass	Children's Hospital Medical Center, Department of Ophthalmology, Boston.	Private	1
Md	Johns Hopkins University School of Medicine, Johns Hopkins Hospital, Wilmer Institute, Baltimore.	Private	2
Mich	Office of Edmond L. Cooper, M.D., Royal Oak	do	1
	University of Michigan Medical Center, University Hospital, Department of Ophthalmic Surgery, Ann Arbor.	Public	1
Mo	St. Louis Ophthalmic Laboratory, St. Louis	Private	2
	Washington University School of Medicine, Department of Ophthalmology, St. Louis.	do	2
N.J	United Hospital of Newark, Eye and Ear Infirmary, Newark	do	1
N.Y	Buffalo Eye and Ear Hospital, Buffalo Orthoptic Center, Buffalo	do	3
	Children's Hospital, Ellicott Eye Clinic, Buffalo	do	1
	Presbyterian Medical Center, Institute of Ophthalmology, New York	do	3
	St. Charles Hospital, Department of Ophthalmology, Port Jefferson	do	1
	State University of New York, Downstate Medical Center, Division of Ophthalmology, Brooklyn.	Public	1
Ohio	Cleveland Clinic Foundation, Cleveland	Private	1
Oreg	University of Oregon Medical School, Department of Ophthalmology, Portland.	Public	1
S.C	Medical College of South Carolina, Department of Ophthalmology, Charleston.	Public	1
Wis	Milwaukee Ophthalmic Institute, Milwaukee Curative Workshop, Milwaukee.	Private	1

Source: American Orthoptic Council.

CHAPTER 23

Orthotic and Prosthetic Technology

Orthopedic and prosthetic appliance makers fabricate and fit artificial limb substitutes to replace those lost or disabled through injury or disease. On the basis of a surgeon's or other physician's prescription, the *prosthetist* makes and fits artificial limbs, while the *orthotist* makes and fits orthopedic braces. The physical therapist and occupational therapist train the patient in the use and care of his new device and the prosthetist and/or orthotist assist with this training. The individual who designs and fits the appliance may be certified in both prosthetics and orthotics.

The Social and Rehabilitation Service of the Department of Health, Education, and Welfare estimates that 3,600 persons were working in 1968 as prosthetists and/or orthotists. Included in this figure are 1,270 who have been certified by the American Board of Certification in Orthotics and Prosthetics. The membership of the American Orthotics and Prosthetics Association included 550 individuals and companies at the close of 1968.

Persons in this field are employed in privately owned facilities, rehabilitation centers, hospitals, or are employed by a Government agency such as the Veterans' Administration or State or local rehabilitation centers. In 1968, 155 orthotists and prosthetists were employed by the VA. In the larger establishments prosthetists and/or orthotists design and fit the prosthetic appliances and orthotic devices, which are fabricated by technical personnel under their supervision.

Orthotists and prosthetists have in the past been trained generally by the apprenticeship method. This type of training requires 4 years of on-the-job training under the supervision of a Board-certified prosthetist-orthotist. Completion of this course, passing the Board Examination, and recommendation by at least three physicians (two of whom must be orthopedic surgeons) are requirements for subsequent certification as a prosthetist and/or orthotist.

Recently, courses of study in prosthetics and orthotics have been initiated in university and junior college programs. New York University offers a 4-year course of study leading to a Bachelor of Science degree. Two junior colleges—Cerritos near Los Angeles and Chicago City College—offer a 2-year associate degree program in prosthetics and orthotics. The University of California in Los Angeles offers a 9-month certificate program in prosthetics and orthotics. In addition, Rancho Los Amigos Hospital in Downey, California, offers a 1-year internship program in orthotics. Delgado Junior College in New Orleans has initiated a technical program in prosthetics and orthotics to train aides in these fields (table 120). In 1968–69, of the 138 enrolled, 60 persons successfully completed programs of prosthetics and orthotics in these schools.

Table 120. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING PROGRAMS IN ORTHOTICS AND PROSTHETICS: NOVEMBER 1968

Location	School [1]	Ownership
	Total, 7 institutions	
California	Cerritos College, Norwalk	Public
	Rancho Los Amigos Hospital, Downey	do.
	University of California, Los Angeles	do.
Illinois	Chicago City College, Chicago	do.
	Northwestern University, Chicago	Private
Louisiana	Delgado College, New Orleans	Public
New York	New York University, New York	Private

[1] Institutions receiving Rehabilitation Services Administration training grants.

Source: U.S. Department of Health, Education, and Welfare; Rehabilitation Services Administration, Division of Training.

CHAPTER 24

Pharmacy

Pharmacy is the health profession which is concerned with the preparation and distribution of medicinal products and entails a comprehensive knowledge of the physical nature, chemical composition, pharmacological action, and therapeutic use of the substances being employed.

About 124,500 pharmacists were in practice as of January 1, 1969. This estimate is based on State registrations as reported by the individual State boards to the National Association of Boards of Pharmacy. The American Pharmaceutical Association, with 34,400 active members, is the professional association for pharmacists.

The *pharmacist* practices in community pharmacies, hospitals, extended care facilities and nursing homes. Others are employed in academic, industrial government and professional association settings. The pharmacist understands the physical and chemical properties of drug products, the methods of compounding and manufacturing and testing for purity and potency. He also understands the pharmacology, therapeutic actions and clinical uses of drug products.

In addition to the traditional services of compounding, dispensing and distribution of drug products, pharmacy services are becoming patient and clinically oriented. Clinical pharmacy is practiced in the community pharmacy by maintaining a patient medication record and advising and counseling the patient on his medications. In the hospital, the clinical pharmacist serves as the drug information specialist to members of the hospital staff. This includes advice on the selection of the proper drug products for treatment, the adverse effects and drug interactions to be expected, the incompatibilities between drug products used simultaneously, the contraindications for use because of the patient's condition and the effect the drug may have on laboratory test results.

Many pharmacists have assumed managerial and administrative responsibilities in community pharmacies and hospitals. These include purchasing, personnel and general administration. Pharmacists employed by manufacturers may supervise the manufacture of pharmaceuticals, supervise the quality control activities, engage in research, and disseminate information on drugs to physicians, dentists, nurses and pharmacists. Others teach in schools of pharmacy, schools of nursing, schools of medicine and write for professional journals.

The number of practicing pharmacists in the United States and possessions was about 117,800 in 1961 and has increased to 124,500 by 1969. However, the rate in relation to population has declined from 65 per 100,000 civilians in 1961 to 62 in 1969 (table 121).

There were 135,900 pharmacists (resident in State or possession) licensed to practice as of January 1, 1969. About 92 percent of these pharmacists were in practice. Many pharmacists register in one or more States—some register in as many as nine. Multiple registrations increased the number of licenses to about 178,400 (table 122).

About 105,200 or 85 percent of the pharmacists who were active as of January 1, 1969, practiced in community pharmacies. Approximately 9,400 practiced in hospitals. Those employed by pharmaceutical manufacturers and wholesalers accounted for about 5,000. The remainder were employed in colleges of pharmacy, government, and other activities (table 123).

According to a 1969 NCHS report "Pharmacy Manpower, U.S.—1966", 83 percent of pharmacists practicing in community pharmacies were in independent establishments and the remaining 17 percent were practicing in a chain of four or more pharmacies.

A minimum of 5 years of study after graduation from high school is required for a Bachelor of Science in Pharmacy (B.S.) or a Bachelor of Pharmacy (B. Pharm.) degree from a college of pharmacy. Two colleges of pharmacy offer a program requiring 6 years of undergraduate study and confer the degree of Doctor of Pharmacy (Pharm. D.). Several other colleges offer the longer program on an optional basis. Most schools

require 1 or 2 years of preprofessional education taken in approved colleges and universities. Students who do advanced study in one of the specialized areas of pharmacy may qualify for the Master of Science and/or Doctor of Philosophy degree.

In 1968–69, 75 colleges of pharmacy in the United States and Puerto Rico offered degrees in the profession. Reports from 75 schools indicated that 14,986 students were enrolled in the last three classes of academic training in the fall of 1968 and 4,039 were graduated during academic year 1967–68 (tables 124 and 125).

A license to practice pharmacy is required in all States and the District of Columbia. To obtain a license, one must be graduated from an accredited college of pharmacy, spend a period of internship of 1 year in almost all States and pass an examination given by the State board of pharmacy. A license obtained in one State is valid through a reciprocity agreement in most States. The profession is sponsoring continuing education programs—either required or voluntary—to assure the continued proficiency of its practitioners.

Pharmacy aides who work under the direct supervision of the pharmacist are employed in some large hospital pharmacies as well as some community pharmacies. No formal programs exist for their training. In 1966, approximately 5,600 pharmacy helpers were employed in hospitals.

Table 121. PHARMACISTS IN RELATION TO POPULATION: SELECTED YEARS, 1951 THROUGH 1969

Year [1]	Civilian resident population in thousands [2]	Pharmacists [3]			Active pharmacists per 100,000 population
		Total	Active in practice	Not in practice	
1969	201,548	135,905	124,486	11,419	62
1968	199,539	135,400	121,529	13,871	61
1967	197,435	132,900	122,421	10,479	62
1966	195,577	131,882	121,093	10,789	62
1965	193,339	128,341	118,284	10,057	61
1963	187,877	130,162	120,990	9,172	64
1961	182,129	126,796	117,796	9,000	65
1956	166,347	117,774	109,605	8,169	66
1951	150,076	108,068	101,630	6,438	68

[1] For 1967–69 includes 50 States, District of Columbia, Puerto Rico, and Virgin Islands. For 1961, 1963 and 1965 includes 50 States, District of Columbia, and Puerto Rico. For 1956 includes 48 states, District of Columbia, Alaska, and Puerto Rico. For 1951 excludes Utah, Hawaii, Puerto Rico, and Virgin Islands.

[2] As of January 1 for 50 States and District of Columbia. As of July 1 of preceding year for Puerto Rico and Virgin Islands.

[3] Includes pharmacists resident in State. Data as of January 1.

Sources: National Association of Boards of Pharmacy: *1969 Proceedings of the National Association of Boards of Pharmacy, Inc., Licensure Statistics and Census of Pharmacy.* Chicago, 1969. Also prior annual issues.

U.S. Bureau of the Census; Population estimates. *Current Population Reports.* Series P–25, Nos. 229, 336, 392, 423, and 429.

Table 122. LOCATION OF LICENSED PHARMACISTS ACCORDING TO RESIDENCE AND ACTIVITY STATUS AND RATIO OF PHARMACISTS TO POPULATION: JANUARY 1, 1969

Location	Total number of licenses	Pharmacists resident in State			Pharmacists residing out of State	Active pharmacists per 100,000 population
		Total	Active in practice	Not in practice		
All locations	178,391	135,905	124,486	11,419	42,486	62.1
United States	177,413	134,930	123,512	11,418	42,483	62.5
Alabama	2,390	2,214	2,057	157	176	58.4
Alaska	179	92	92	—	87	38.2
Arizona	2,478	1,186	1,016	170	1,292	62.3
Arkansas	1,648	1,175	995	180	473	50.4
California	13,599	12,739	11,640	1,099	860	61.5
Colorado	3,038	1,883	1,643	240	1,155	82.7
Connecticut	3,133	2,624	2,524	100	509	85.5
Delaware	463	260	233	27	203	44.4
District of Columbia	1,675	648	595	53	1,027	75.3
Florida	6,169	4,828	4,432	396	1,341	73.3
Georgia	3,682	2,732	2,504	228	950	56.2
Hawaii	267	205	202	3	62	27.8
Idaho	1,369	562	490	72	807	70.1
Illinois	9,213	6,661	5,756	905	2,552	52.6
Indiana	5,020	3,510	3,097	413	1,510	61.3
Iowa	3,189	2,001	1,787	214	1,188	64.5
Kansas	2,304	1,526	1,285	241	778	56.8
Kentucky	2,205	1,734	1,542	192	471	48.8
Louisiana	2,811	2,267	2,223	44	544	60.4
Maine	760	450	436	14	310	45.3
Maryland	2,846	2,507	2,242	265	339	61.0
Massachusetts	6,627	5,156	4,699	457	1,471	86.5
Michigan	6,018	5,938	5,420	518	80	62.2
Minnesota	3,219	2,409	2,221	188	810	61.0
Mississippi	1,479	1,130	1,087	43	349	46.8
Missouri	4,543	3,057	2,518	539	1,486	54.9
Montana	834	527	426	101	307	62.1
Nebraska	2,054	1,157	1,009	148	897	70.9
Nevada	2,747	336	323	13	2,411	73.6
New Hampshire	535	346	338	8	189	48.4
New Jersey	5,838	4,686	4,208	478	1,152	59.9
New Mexico	1,163	610	564	46	553	57.0
New York	17,612	12,751	12,493	258	4,861	69.3
North Carolina	2,508	2,130	1,973	157	378	39.4
North Dakota	1,175	401	354	47	774	57.7
Ohio	8,150	6,844	6,495	349	1,306	61.5
Oklahoma	3,170	2,168	2,122	46	1,002	85.7
Oregon	2,210	1,508	1,321	187	702	66.0
Pennsylvania	11,008	10,365	9,605	760	643	82.0
Rhode Island	1,126	836	746	90	290	84.5
South Carolina	1,546	1,412	1,375	37	134	53.2
South Dakota	889	458	458	—	431	70.4
Tennessee	3,023	2,647	2,351	296	376	59.7
Texas	8,121	6,830	6,084	746	1,291	56.4
Utah	1,238	736	697	39	502	67.7
Vermont	806	223	208	15	583	49.1
Virginia	2,512	2,050	1,860	190	462	42.2
Washington	3,780	2,775	2,450	325	1,005	76.5

See footnotes at end of table.

Table 122. LOCATION OF LICENSED PHARMACISTS ACCORDING TO RESIDENCE AND ACTIVITY STATUS AND RATIO OF PHARMACISTS TO POPULATION: JANUARY 1, 1969—Con.

Location	Total number of licenses	Pharmacists resident in State			Pharmacists residing out of State	Active pharmacists per 100,000 population [1]
		Total	Active in practice	Not in practice		
West Virginia	1,083	732	710	22	351	39.4
Wisconsin	3,165	2,612	2,344	268	553	55.6
Wyoming	796	296	262	34	500	84.2
Puerto Rico	948	948	948	—	—	[1] 35.0
Virgin Islands	30	27	26	1	3	[1] 47.4

[1] Civilian resident population as of July 1, 1968.

Sources: National Association of Boards of Pharmacy Proceedings, 1969.

U.S. Bureau of the Census: Population estimates. *Current Population Reports*, Series P-25, No. 414, January 1969, and No. 423, May 1969.

Table 123. TYPE OF PRACTICE OF ACTIVE PHARMACISTS: JANUARY 1, 1969

Location	Active pharmacists	Community pharmacy			Hospital pharmacy	Manufacturing and wholesale	Teaching, government, and other
		Total	Owner or partner	Employee			
All locations	124,486	105,203	51,584	53,619	9,428	4,979	4,876
United States	123,512	104,390	51,244	53,146	9,398	4,965	4,759
Alabama	2,057	1,737	727	1,010	196	14	110
Alaska	92	82	40	42	2	5	3
Arizona	1,016	833	244	589	121	31	31
Arkansas	995	924	446	478	52	9	10
California	11,640	10,259	5,630	4,629	889	320	172
Colorado	1,643	1,426	477	949	68	96	53
Connecticut	2,524	1,868	862	1,006	207	139	310
Delaware	233	203	73	130	18	8	4
District of Columbia	595	497	86	411	51	18	29
Florida	4,432	3,781	1,463	2,318	365	35	253
Georgia	2,504	1,921	1,086	835	127	276	180
Hawaii	202	143	45	98	37	16	6
Idaho	490	436	225	211	26	15	13
Illinois	5,756	4,700	1,973	2,727	656	243	157
Indiana	3,097	2,524	979	1,545	241	244	88
Iowa	1,787	1,513	826	687	125	23	126
Kansas	1,285	1,125	571	554	107	38	15
Kentucky	1,542	1,386	641	745	115	18	23
Louisiana	2,223	2,012	972	1,040	90	60	61
Maine	436	411	316	95	11	11	3
Maryland	2,242	1,970	372	1,598	77	89	106
Massachusetts	4,699	3,797	1,557	2,240	385	249	268
Michigan	5,420	4,569	2,027	2,542	604	158	89
Minnesota	2,221	1,640	879	761	167	60	354
Mississippi	1,087	974	547	427	66	30	17

Table 123. TYPE OF PRACTICE OF ACTIVE PHARMACISTS: JANUARY 1, 1969—Continued

Location	Active pharmacists	Community pharmacy			Hospital pharmacy	Manufacturing and wholesale	Teaching, government, and other
		Total	Owner or partner	Employee			
Missouri	2,518	2,134	928	1,206	249	121	14
Montana	426	383	216	167	22	12	9
Nebraska	1,009	822	402	420	72	57	58
Nevada	323	295	75	220	20	3	5
New Hampshire	338	308	166	142	20	7	3
New Jersey	4,208	3,704	1,852	1,852	138	231	135
New Mexico	564	455	232	223	49	18	42
New York	12,493	10,146	7,815	2,331	931	897	519
North Carolina	1,973	1,807	866	941	115	26	25
North Dakota	354	311	161	150	26	9	8
Ohio	6,495	5,700	2,625	3,075	365	220	210
Oklahoma	2,122	1,938	763	1,175	65	64	55
Oregon	1,321	1,152	467	685	101	27	41
Pennsylvania	9,605	8,072	4,450	3,622	650	525	358
Rhode Island	746	625	233	392	64	28	29
South Carolina	1,375	1,253	521	732	54	26	42
South Dakota	458	408	188	220	22	17	11
Tennessee	2,351	2,003	957	1,046	212	89	47
Texas	6,084	5,282	2,326	2,956	450	168	184
Utah	697	566	220	346	62	29	40
Vermont	208	193	85	108	5	3	7
Virginia	1,860	1,435	630	805	128	37	260
Washington	2,450	1,940	776	1,164	343	69	98
West Virginia	710	618	287	331	77	8	7
Wisconsin	2,344	1,876	833	1,043	348	66	54
Wyoming	262	233	106	127	9	3	17
Pureto Rico	948	793	331	462	25	14	116
Virgin Islands	26	20	9	11	5	—	1

Source: National Association of Boards of Pharmacy: *1969 Proceedings of the National Association of Board of Pharmacy, Inc., Licensure Statistics and Census of Pharmacy*. Chicago, 1969.

Table 124. SCHOOLS OF PHARMACY, STUDENTS AND GRADUATES: 1959–60 THROUGH 1968-69

Academic year [1]	Schools	Students [2]	Graduates	Academic year [1]	Schools	Students [2]	Graduates
1968–69	75	14,986	4,316	1963–64	77	10,405	2,218
1967–68	75	14,324	4,039	1962–63	77	10,761	4,214
1966–67	75	13,261	3,799	1961–62	77	10,974	3,749
1965–66	75	12,518	3,692	1960–61	77	13,755	3,483
1964–65	76	12,088	3,388	1959–60	77	12,662	3,552

[1] Loyola University School of Pharmacy closed in June 1965. George Washington University School of Pharmacy closed in June 1964.

[2] Includes enrollment in last 3 years of pharmacy school program leading to a B.S., B.Pharm., and Pharm. D. degrees.

Source: American Association of Colleges of Pharmacy: *American Journal of Pharmaceutical Education*, 33, February 1969. Also prior annual issues. Unpublished data on Hampden College and University of Puerto Rico.

Table 125. LOCATION AND OWNERSHIP OF SCHOOLS OF PHARMACY, AND NUMBER OF STUDENTS AND GRADUATES: 1967–68

Location	School	Ownership	Students	Graduates
	Total 75 schools		14,324	4,039
Ala	Auburn University School of Pharmacy, Auburn	Public	223	77
	Samford University (Howard College) School of Pharmacy, Birmingham.	Private	202	60
Ariz	University of Arizona College of Pharmacy, Tucson	Public	216	61
Ark	University of Arkansas School of Pharmacy, Little Rock	do	129	41
Calif	University of California School of Pharmacy, San Francisco	do	241	64
	University of the Pacific School of Pharmacy, Stockton	Private	199	122
	University of Southern California School of Pharmacy, Los Angeles.	do	295	83
Colo	University of Colorado School of Pharmacy, Boulder	Public	113	27
Conn	University of Connecticut School of Pharmacy, Storrs	do	207	43
D.C	Howard University College of Pharmacy, Washington	Private	108	25
Fla	Florida Agricultural and Mechanical University School of Pharmacy, Tallahassee.	Public	63	20
	University of Florida College of Pharmacy, Gainesville	do	231	104
Ga	Mercer University, Southern College of Pharmacy, Atlanta	Private	191	34
	University of Georgia School of Pharmacy, Athens	Public	393	101
Idaho	Idaho State University College of Pharmacy, Pocatello	do	105	37
Ill	University of Illinois at the Medical Center College of Pharmacy, Chicago.	do	373	102
Ind	Butler University College of Pharmacy, Indianapolis	Private	105	32
	Purdue University School of Pharamcy and Pharmacal Sciences, Lafayette.	Public	312	90
Iowa	Drake University College of Pharmacy, Des Moines	Private	169	58
	University of Iowa, College of Pharmacy, Iowa City	Public	176	54
Kans	University of Kansas School of Pharmacy, Lawrence	do	151	34
Ky	University of Kentucky College of Pharmacy, Lexington	do	152	38
La	Northeast Louisiana State College School of Pharmacy, Monroe.	do	394	121
	Xavier University of Louisiana College of Pharmacy, New Orleans.	Private	48	16
Md	University of Maryland School of Pharmacy, Baltimore	Public	143	35
Mass	Hampden College School of Pharmacy, Williamansett [1]	Private	50	13
	Massachusetts College of Pharmacy, Boston	do	323	97
	Northeastern University College of Pharmacy, Boston	do	141	34
Mich	Ferris State College School of Pharmacy, Big Rapids	Public	258	79
	University of Michigan College of Pharmacy, Ann Arbor	*do*	*101*	38
	Wayne State University College of Pharmacy, Detroit	do	127	35
Minn	University of Minnesota College of Pharmacy, Minneapolis	do	258	53
Miss	University of Mississippi School of Pharmacy, University	do	216	62
Mo	St. Louis College of Pharmacy, St. Louis	Private	269	69
	University of Missouri at Kansas City School of Pharmacy, Kansas City.	Public	126	37
Mont	University of Montana at Missoula School of Pharmacy, Missoula.	do	101	38
Nebr	Creighton University School of Pharmacy, Omaha	Private	104	33
	University of Nebraska College of Pharmacy, Lincoln	Public	180	40
N.J	Rutgers, The State University College of Pharmacy, Newark	do	139	41
N.Mex	University of New Mexico College of Pharmacy, Albuquerque	do	102	32

See footnotes at end of table.

Table 125. LOCATION AND OWNERSHIP OF SCHOOLS OF PHARMACY, AND NUMBER OF STUDENTS AND GRADUATES: 1967-68—Continued

Location	School	Ownership	Students	Graduates
N.Y.	Albany College of Pharmacy of Union University, Albany	Private	244	84
	Long Island University, Brooklyn College of Pharmacy, Brooklyn.	do	270	86
	Columbia University College of Pharmaceutical Sciences of the City of New York, New York.	do	176	38
	Fordham University College of Pharmacy, Bronx	do	138	37
	St. John's University College of Pharmacy, Jamaica	do	198	48
	State University of New York at Buffalo School of Pharmacy, Buffalo.	Public	152	34
N.C.	University of North Carolina School of Pharmacy, Chapel Hill.	do	311	68
N.Dak.	North Dakota State University College of Pharmacy, Fargo	do	244	69
Ohio	Ohio Northern University School of Pharmacy, Ada	Private	90	50
	Ohio State University College of Pharmacy, Columbus	Public	179	15
	University of Cincinnati College of Pharmacy, Cincinnati	do	170	50
	University of Toledo College of Pharmacy, Toledo	do	81	23
Okla.	Southwestern State College School of Pharmacy, Weatherford.	do	332	84
	University of Oklahoma College of Pharmacy, Norman	do	217	61
Oreg.	Oregon State University School of Pharmacy, Corvallis	do	218	46
Pa.	Duquesne University School of Pharmacy, Pittsburgh	Private	99	27
	Philadelphia College of Pharmacy and Science, Philadelphia	do	317	91
	Temple University School of Pharmacy, Philadelphia	do	183	32
	University of Pittsburgh School of Pharmacy, Pittsburgh	do	154	54
R.I.	University of Rhode Island College of Pharmacy, Kingston	Public	94	24
S.C.	Medical College of South Carolina School of Pharmacy, Charleston.	do	95	39
	University of South Carolina School of Pharmacy, Columbia	do	133	29
S.Dak.	South Dakota State University College of Pharmacy, Brookings.	do	171	49
Tenn.	University of Tennessee College of Pharmacy, Memphis	do	279	85
Tex.	Texas Southern University School of Pharmacy, Houston	do	153	33
	University of Houston College of Pharmacy, Houston	do	338	103
	University of Texas College of Pharmacy, Austin	do	412	121
Utah	University of Utah College of Pharmacy, Salt Lake City	do	162	47
Va.	Virginia Commonwealth University School of Pharmacy, Richmond.	do	210	61
Wash.	University of Washington College of Pharmacy, Seattle	do	204	57
	Washington State University College of Pharmacy, Pullman	do	123	36
W.Va.	West Virginia University School of Pharmacy, Morgantown	do	130	44
Wis.	University of Wisconsin School of Pharmacy, Madison	do	397	79
Wyo.	University of Wyoming College of Pharmacy, Laramie	do	64	17
P.R.	University of Puerto Rico College of Pharmacy, Rio Piedras	do	152	38

[1] Not listed by the accrediting body.

Source: American Association of Colleges of Pharmacy.

CHAPTER 25

Physical Therapy

Physical therapy is concerned with the restoration of function and the prevention of disability following disease, injury, or loss of a bodily part. The goal is to help the patient reach his maximum performance and to assume his due place in society while learning to live within the limits of his capabilities. The therapeutic properties of exercise, heat, cold, electricity, ultrasound, and massage are used to achieve this goal. Upon referral by a physician, the physical therapist evaluates the patient and plans the program which will be most effective.

The number of persons employed as *physical therapists* has increased from about 4,600 in 1950 to nearly 9,000 in 1960 and may have reached 13,500 in 1968 (table 126). This estimate assumes that the 9,758 members of the American Physical Therapy Association who are in active practice constitute about two-thirds of the labor force in this field (table 127). The majority (almost 8,500 in 1966) work in hospitals, while others were employed by rehabilitation centers, schools or societies for crippled children, and public health agencies.

A license is required to practice physical therapy in 49 states, the District of Columbia, Puerto Rico and the Virgin Islands. To obtain a license, an applicant must have a degree or certificate from an approved school of physical therapy and pass a State Board examination. Seven States will accept certification by the American Registry of Physical Therapists in lieu of the written examination (*49*).

Forty-eight colleges and universities offer AMA-APTA programs leading to professional qualification in physical therapy under three plans of education: 44 have a 4-year bachelor's degree course for high school graduates and transfer students, 17 have a 12-or 16-month certificate course for students who hold a bachelor's degree in a subject other than physical therapy, and three have a 2-year graduate program leading to a master's degree for students with bachelor's degrees and the requisite background. As part of the total educational program all plans provide for a minimum of 4 months' clinical education experience in health care facilities. During this time physical therapy students participate in the care of patients under the supervision of qualified physical therapists.

In the fall of 1968, a total of 1,385 students—1,112 seniors and about 273 postbaccalaureate students—were enrolled in their final academic year. During the calendar year 1968, 1,122 were graduated as clinical physical therapists (tables 128 and 129). An increased number of graduates are anticipated in the near future due to expanded college enrollment and to new courses in physical therapy now being developed at six institutions.

The physical therapist may have the help of a *physical therapy assistant and/or aide* who works directly under supervision in carrying out the program of rehabilitating patients in hospitals and other health care facilities. Physical therapy assistants are licensed in 7 States. Inservice training programs for aides are conducted by some hospitals and health agencies. Two-year programs for physical therapy assistants are being developed in eighteen junior colleges, with their first graduating classes in 1968–69. Between 6,000 and 8,000 assistants and aides are currently employed.

REFERENCE

(*49*) National Center for Health Statistics: *State Licensing of Health Occupations.* PHS Pub. No. 1758. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968.

Table 126. NUMBER OF ACTIVE PHYSICAL THERAPISTS: SELECTED YEARS 1950 THROUGH 1968

Year	Number of active physical therapists	Year	Number of active physical therapists
1968	13,500	1960	9,000
1967	13,000	1955	7,300
1965	12,000	1950	4,600

Sources: Bureau of Health Professions Education and Manpower Training: *Health Manpower Source Book 20.* PHS Pub. No. 263 Section 20. National Institutes of Health, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969.

American Physical Therapy Association.

Table 127. LOCATION OF PHYSICAL THERAPISTS WHO ARE MEMBERS OF THE AMERICAN PHYSICAL THERAPY ASSOCIATION: 1969 [1]

Location	Members in active practice	Members with part-time practice or no practice	Location	Members in active practice	Members with part-time practice or no practice
All locations	9,758	2,477	Missouri	224	45
			Montana	20	7
United States	9,567	2,405	Nebraska	63	9
			Nevada	26	6
Alabama	71	6	New Hampshire	45	21
Alaska	20	9	New Jersey	270	107
Arizona	92	42	New Mexico	43	15
Arkansas	35	5	New York	827	187
California	1,488	369	North Carolina	182	38
Colorado	202	60	North Dakota	27	6
Connecticut	236	89	Ohio	444	116
Delaware	32	15	Oklahoma	105	12
District of Columbia	147	15	Oregon	137	26
Florida	318	81	Pennsylvania	573	120
Georgia	121	19	Rhode Island	47	25
Hawaii	70	9	South Carolina	61	11
Idaho	22	6	South Dakota	29	1
Illinois	485	109	Tennessee	88	16
Indiana	136	42	Texas	449	81
Iowa	140	28	Utah	42	8
Kansas	81	11	Vermont	29	9
Kentucky	81	16	Virginia	172	49
Louisiana	85	21	Washington	238	78
Maine	48	25	West Virginia	45	7
Maryland	168	46	Wisconsin	279	80
Massachusetts	460	181	Wyoming	13	7
Michigan	312	73			
Minnesota	200	35	Puerto Rico	43	10
Mississippi	39	6	Foreign	148	62

[1] Membership location as of April 1969.

Source: American Physical Therapy Association.

Table 128. INSTITUTIONS OFFERING APPROVED COURSES IN PHYSICAL THERAPY, STUDENTS AND GRADUATES: 1960–61 THROUGH 1968–69

Academic year	Institutions	Seniors and postbaccalaureate students [1]	Graduates	Academic year	Institutions	Seniors and postbaccalaureate students [1]	Graduates
1968–69	48	1,385	.....	1963–64	42	930	891
1967–68	48	1,165	1,122	1962–63	42	814	757
1966–67	43	1,066	1,005	1961–62	40	727	689
1965–66	42	991	936	1960–61	39	739	682
1964–65	42	955	890				

[1] October enrollment of undergraduate students in 4th year of P.T. degree program, 5th year for postbaccalaureate students, 6th year for students in master's degree programs.

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.

American Physical Therapy Association.

Table 129. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING APPROVED COURSES IN PHYSICAL THERAPY AND NUMBER OF STUDENTS AND GRADUATES: 1968

Location	Institution	Ownership	Seniors [1] (1968–69)	Postbaccalaureate students [2] (1968–69)	Graduates [3] (1968)
	Total, 48 institutions	.....	1,112	273	1,122
Ala	University of Alabama in Birmingham, Curriculum in Physical Therapy, Birmingham.	Public	9	—	5
Calif	California State College at Long Beach, Physical Therapy Dept., Long Beach.	do	17	14	9
	Childrens Hospital of Los Angeles, School of Physical Therapy, Los Angeles.	Private	—	16	16
	Loma Linda University, Dept. of Physical Therapy, School of Health Related Professions, Loma Linda.	do	44	—	41
	Stanford University, Division of Physical Therapy, School of Medicine, Palo Alto.	do	[4] 7	—	22
	University of California, Curriculum in Physical Therapy, The Medical Center, San Francisco.	Public	19	15	32
	University of Southern California Department of Physical Therapy, Los Angeles.	Private	[5] 33	—	25
Colo	University of Colorado, Curriculum in Physical Therapy, Medical School, Denver.	Public	37	—	30
Conn	University of Connecticut, School of Physical Therapy, Storrs.	do	65	—	38
Fla	University of Florida, Department of Physical Therapy, J. Hillis Miller Center, Gainesville.	do	20	—	19
Ill	Northwestern University, Programs in Physical Therapy, Medical School, Chicago.	Private	14	12	26
Ind	Indiana University, Physical Therapy Program, School of Medicine, Indianapolis.	Public	30	—	28
Iowa	University of Iowa, Physical Therapy, Children's Hospital, Iowa City.	do	—	[6] 33	26
Kans	University of Kansas, Medical Center, Physical Therapy Education, Kansas City.	do	29	11	34

See footnotes at end of table.

Table 129. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING APPROVED COURSES IN PHYSICAL THERAPY AND NUMBER OF STUDENTS AND GRADUATES: 1968—Continued

Location	Institution	Ownership	Seniors [1] (1968–69)	Postbaccalaureate students [2] (1968–69)	Graduates [3] (1968)
Ky	University of Kentucky, Department of Physical Therapy, School of Allied Health Professions, Medical Center, Lexington.	Public	12	—	3
Md	University of Maryland, Department of Physical Therapy, School of Medicine, Baltimore.	do	20	—	16
Mass	Boston University, Division of Physical Therapy, Sargent College of Allied Health Professions, Boston.	Private	47	—	28
	Northeastern University, Department of Physical Therapy, Boston-Bouve College, Boston.	do	32	—	29
	Simmons College, Program in Physical Therapy, Boston.	do	7	3	12
Mich	University of Michigan, Curriculum in Physical Therapy, Medical Center, Ann Arbor.	Public	36	—	28
	Wayne State University, Division of Physical Therapy, Detroit.	do	6	—	4
Minn	Mayo Foundation, School of Physical Therapy, Rochester.	Private	40	—	34
	University of Minnesota, Course in Physical Therapy, Minneapolis.	Public	44	—	31
Mo	St. Louis University, Department of Physical Therapy, St. Louis.	Private	22	—	28
	University of Missouri, Physical Therapy Curriculum, Medical Center, Columbia.	Public	29	—	20
	Washington University, Department of Physical Therapy, School of Medicine, St. Louis.	Private	15	—	12
N.Y	Columbia University, Courses in Physical Therapy, College of Physicians and Surgeons, New York.	do	15	21	26
	Ithaca College—Albert Einstein College of Medicine, Division of Physical Therapy, Ithaca.	do	69	—	59
	New York University, Physical Therapy Program, School of Education, New York.	do	17	[6] 6	23
	Russell Sage College-Albany Medical College, School of Physical Therapy, Albany.	do	25	—	19
	State University of New York at Buffalo, Department of Physical Therapy, Buffalo.	Public	27	—	21
	State University of New York, Downstate Medical Center, Program in Physical Therapy, Brooklyn.	do	11	—	3
N.C	Duke University, Programs in Physical Therapy, Medical College, Durham.	Private	16	[6] 18	10
	University of North Carolina, Division of Physical Therapy, School of Medicine, Chapel Hill.	Public	16	—	15
Ohio	Case Western Reserve University, Graduate Physical Therapy Curriculum, Cleveland.	Private	[4] 9	—	7
	Ohio State University, Curriculum in Physical Therapy, Columbus.	Public	39	6	44
Okla	University of Oklahoma, School of Physical Therapy, Medical Center, Oklahoma City.	do	20	—	20
Pa	D. T. Watson School of Physiatrics, Division of Physical Therapy, Leetsdale.	Private	22	16	37
	University of Pennsylvania, Department of Physical Therapy, Philadelphia.	do	6	66	57

See footnotes at end of table.

Table 129. LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING APPROVED COURSES IN PHYSICAL THERAPY AND NUMBER OF STUDENTS AND GRADUATES: 1968—Continued

Location	Institution	Ownership	Seniors [1] (1968–69)	Postbaccalaureate students [2] (1968–69)	Graduates [3] (1968)
Tenn	University of Tennessee, Physical Therapy School, Memphis.	Public	8	—	4
Texas	Baylor University, School of Physical Therapy, Baylor University Medical Center, Dallas.	Private	10	11	18
	Medical Field Service School, Physical Therapy Course, Brooke Army Medical Center, Fort Sam Houston.	Public	—	19	19
	University of Texas, School of Physical Therapy, The Medical Branch, Galveston.	do	25	6	23
Va	Medical College of Virginia, School of Physical Therapy, Richmond.	do	22	—	23
Wash	University of Washington, Curriculum in Physical Therapy, University Hospital, Seattle.	do	15	—	15
Wis	Marquette School of Medicine, Inc., Curriculum in Physical Therapy, Milwaukee.	Private	29	—	26
	University of Wisconsin, Course in Physical Therapy, Madison.	Public	52	—	35
P.R	University of Puerto Rico, School of Physical and Occupational Therapy, Puerto Rico Medical Center, Industrial Hospital, Rio Piedras.	do	25	—	22

[1] October 1968 enrollment in final year of P.T. baccalaureate or master's degree program.

[2] October 1968 enrollment in 5th year for students with degree in other than P.T.

[3] Calendar year 1968 data on graduates.

[4] Master's degree program offered.

[5] Bachelor's and master's degree programs offered

[6] May lead to a master's degree.

Source: American Physical Therapy Association.

CHAPTER 26

Podiatry

Podiatry is that profession which deals with the examination, diagnosis, prevention, treatment and care of conditions and functions of the human foot. The podiatrist performs surgical and other operative procedures on the foot, prescribes corrective devices, and prescribes and administers drugs and physical therapy.

In 1968, there were an estimated 8,200 podiatrists licensed in the United States (table 130). Probably 95 percent of these registered podiatrists are active practitioners. This is an increase from about 6,400 in 1950 to nearly 7,800 in 1968.

Information collected in a 1964 survey on the professional activities of registered podiatrists is presented in table 131. Nearly all of the active podiatrists are self-employed, with relatively few holding full-time salaried positions in hospitals or schools of podiatry. They tend to practice mainly in large cities in the most heavily populated States.

Podiatry specialty organizations recognized by the American Podiatry Association are the American College of Foot Orthopedists (99 specialists); American College of Foot Roentgenologists (62); American College of Foot Surgeons (349); and American Society of Podiatric Dermatology (35). The American Podiatry Association (5,200 members) is the professional organization for podiatrists.

All States and the District of Columbia require a license for the practice of podiatry. To qualify for a license, an applicant must have graduated from a college of podiatry and must pass a State board (or the National Board) examination. In addition, a few States require a period of internship or practice.

The five colleges of podiatry in the United States admit students who have already completed at least 2 years of college. The subsequent 4 years of training lead to a degree of Doctor of Podiatric Medicine (D.P.M.) or Doctor of Podiatry (Pod.D.).

In the academic year 1968–69, the five colleges enrolled 1,044 students and graduated 204 podiatrists (tables 132 and 133).

Table 130. LOCATION OF REGISTERED PODIATRISTS: 1968

Location	Number of podiatrists	Location	Number of podiatrists
United States	[1] 8,200	Missouri	102
		Montana	14
Alabama	25	Nebraska	47
Alaska	4	Nevada	18
Arizona	48	New Hampshire	26
Arkansas	26	New Jersey	433
California	850	New Mexico	23
Colorado	80	New York	1,423
Connecticut	215	North Carolina	57
Delaware	24	North Dakota	7
District of Columbia	64	Ohio	568
Florida	231	Oklahoma	60
Georgia	62	Oregon	42
Hawaii	6	Pennsylvania	780
Idaho	16	Rhode Island	65
Illinois	770	South Carolina	21
Indiana	157	South Dakota	18
Iowa	103	Tennessee	43
Kansas	53	Texas	209
Kentucky	69	Utah	25
Louisiana	39	Vermont	9
Maine	27	Virginia	68
Maryland	103	Washington	72
Massachusetts	511	West Virginia	51
Michigan	281	Wisconsin	153
Minnesota	85	Wyoming	8
Mississippi	9		

[1] Includes active and inactive podiatrists distributed by State of residence.

Source: NCHS estimates based on unpublished State licensing lists supplied by the American Podiatry Association.

Table 131. TYPE OF PRACTICE OF PODIATRISTS: 1964

Type of practice	Number of respondents	Percent of respondents	Tyep of practice	Number of respondents	Percent of respondents
Total	[1] 3,290	100.0	Administration, teaching, or research	12	0.4
Private practice	3,093	94.0	Other	63	1.9
Institutional practice	49	1.5	Retired	73	2.2

[1] The questionnaire was mailed to all known registered podiatists (8,008).

Source: American Podiatry Association, Special Studies Division: 1964 survey of the podiatry profession. *J. Am. Podiatry A.* Vols. 54 and 55, 1964 and 1965. Reprint No. 1:6601.

Table 132. PODIATRY COLLEGES, STUDENTS, AND GRADUATES: SELECTED YEARS, 1951–52 THROUGH 1968–69

Academic year	Colleges	Students		Graduates	Academic	Colleges	Students		Graduates
		Total	First year				Total	First year	
1968–69	5	1,044	328	204	1962–63	4	496	151	114
1967–68	5	933	297	162	1961–62	5	472	120	96
1966–67	5	843	287	166	1960–61	5	478	107	116
1965–66	5	713	223	136	1959–60	5	465	.....	112
1964–65	5	625	177	122	1955–56	6	700	.....	142
1963–64	5	585	192	97	1951–52	8	1,633	.....	476

Source: American Association of Colleges of Podiatric Medicine.

Table 133. LOCATION AND OWNERSHIP OF PODIATRY COLLEGES AND NUMBER OF STUDENTS AND GRADUATES: 1968–69

Location	School	Ownership	Students		Graduates
			Total	First year	
	Total, 5 schools		1,044	328	204
Calif.	California College of Podiatric Medicine, San Francisco.	Private	196	56	43
Ill.	Illinois College of Podiatric Medicine, Chicago	do.	207	86	28
N.Y.	M. J. Lewi College of Podiatry, New York	do.	177	43	42
Ohio	Ohio College of Podiatric Medicine, Cleveland	do.	309	83	57
Pa.	Pennsylvania College of Podiatric Medicine, Philadelphia.	do.	155	60	34

Source: American Association of Colleges of Podiatric Medicine.

CHAPTER 27

Psychology

Psychology is a science dealing with the understanding and modification of human behavior. As such it is directly relevant to problems of mental health and to other areas of health in which psychological functioning involving learning, perception, development, adjustment, ability, and personality are important factors.

About one-third of all *psychologists* are engaged in health activities. The number of psychologists in the health field has increased from about 3,000 in 1950, to more than 12,000 in 1968 (table 134). The American Psychological Association has about 30,000 members or associates in all fields. The Association bases eligibility for full membership upon completion of a program leading to a doctoral degree in psychology.

Just over one-fourth of all psychologists in the National Science Foundations, 1968 National Register of Scientific and Technical Personnel are in an area of psychology related to the health field called *clinical psychology*. Approximately 6,400 clinical psychologists are engaged primarily in the diagnosis and treatment of mental illness in hospitals and clinics, although some are in private practice. These individuals are performing as consultants to community mental health programs and to school systems in increasing numbers. Many are engaged in, or direct, basic and applied research on problems related to these concerns. The training of a clinical psychologist, in addition to research training and experience, entails a year of supervised internship in an appropriate setting prior to the granting of the Ph.D.

About 2,300 *counseling psychologists* work in many settings, including schools, industry and community agencies. They help the individual understand himself so that he can capitalize on his strengths to deal effectively with his own problems. In this kind of counseling, emphasis is largely on forestalling mental illness.

Approximately 2,100 *school psychologists* are engaged in health related activities; including the testing of retardates in diagnosing learning and behavior problems, to actively intervening in therapy sessions with emotionally disturbed children.

Not limited to the health field are *social psychologists* who are concerned with group reactions and the ways in which our social attitudes develop, and *measurement psychologists* or *psychometrists* who devise tests for measuring people's mental, emotional, and social characteristics. Relatively few social and measurement psychologists work in the health field—about 700 and 600 persons respectively.

As of 1969, there were provisions for licensing psychologists in 40 States.

Although some of the practicing psychologists have had only 1 or 2 years of graduate study in psychology, the usual requirement for practice is 4 years of study leading to a Ph.D. degree. In clinical or counseling psychology, the requirements for the Ph.D. degree generally include 1 year of internship or supervised clinical experience.

About 100 universities offer doctoral degrees in clinical psychology, including 70 programs accredited by the American Psychological Association. In all, approximately 287 university programs offer advanced degrees in psychology. During 1967–68, there were 3,482 master's degrees and 1,452 doctoral degrees conferred in psychology. Of the 1,452 doctoral degrees, 483 were in clinical psychology, 103 in counseling psychology and 121 in social psychology (tables 135, 136, and 137).

Table 134. LOCATION OF PSYCHOLOGISTS IN THE HEALTH FIELD: 1968

Location	Total	Clinical	Counseling	School	Social	Psychometrics
All locations	[1] 12,051	6,414	2,248	2,092	731	566
United States	11,935	6,367	2,227	2,084	704	553
Alabama	65	39	15	3	3	5
Alaska	9	5	3	1	—	—
Arizona	100	49	32	14	3	2
Arkansas	43	29	8	2	2	2
California	1,739	881	281	431	95	51
Colorado	225	133	39	29	16	8
Connecticut	222	127	29	39	23	4
Delaware	40	17	5	14	4	—
District of Columbia	248	122	42	11	33	40
Florida	280	152	58	48	11	11
Georgia	153	83	40	11	8	11
Hawaii	49	27	9	7	3	3
Idaho	39	15	19	4	—	1
Illinois	720	359	140	142	34	45
Indiana	195	107	38	28	8	14
Iowa	175	77	30	56	9	3
Kansas	176	106	35	22	6	7
Kentucky	90	56	15	6	7	6
Louisiana	75	49	10	14	2	—
Maine	42	24	8	5	3	2
Maryland	269	148	32	48	18	23
Massachusetts	439	256	86	30	50	17
Michigan	526	290	71	97	47	21
Minnesota	253	115	85	34	7	12
Mississippi	35	24	9	1	—	1
Missouri	178	109	42	9	14	4
Montana	19	10	6	----------	2	1
Nebraska	67	38	15	6	2	6
Nevada	22	10	5	2	3	2
New Hampshire	33	17	9	4	1	2
New Jersey	437	217	46	132	18	24
New Mexico	46	25	12	4	1	4
New York	1,901	1,051	292	386	103	69
North Carolina	149	79	28	12	17	13
North Dakota	32	15	13	1	2	1
Ohio	497	268	98	88	24	19
Oklahoma	88	57	16	8	4	3
Oregon	143	81	34	8	9	11
Pennsylvania	691	354	157	107	46	27
Rhode Island	43	25	7	8	1	2
South Carolina	56	26	13	12	1	4
South Dakota	23	14	6	1	1	1
Tennessee	132	75	26	16	7	8
Texas	337	178	88	26	17	28
Utah	64	34	19	5	3	3
Vermont	23	14	5	3	1	—
Virginia	167	102	26	20	13	6
Washington	229	103	47	65	7	7
West Virginia	46	27	10	3	2	4
Wisconsin	275	132	58	57	13	15
Wyoming	30	16	10	4	—	—

See footnotes at end of table.

Table 134. LOCATION OF PSYCHOLOGISTS IN THE HEALTH FIELD: 1968—Continued

Location	Total	Clinical	Counseling	School	Social	Psychometrics
Puerto Rico	12	5	3	2	—	2
Virgin Islands	2	1	1	—	—	—
Canal Zone	1	1	—	—	—	—
Foreign	101	40	17	6	27	11

[1] Specialty as indicated by respondents to the Psychology Section of the 1968 Register. Data presented are based on question which asks for the respondent's specialization most closely related to *present* employment. Of all persons to whom questionnaires were sent, 23,077 returned usable data.

Source: Prepared by the Manpower Studies Section, Manpower and Analytic Studies Branch, National Institute of Mental Health, based on National Science Foundations: *1968 National Register of Scientific and Technical Personnel.*

Table 135. EARNED DEGREES CONFERRED IN PSYCHOLOGY AT DOCTORAL LEVEL: 1959–60 THROUGH 1967–68

Year	Total	Clinical psychology	Counseling and guidance psychology [1]	Social psychology	All others
1967–68	1,452	483	103	121	745
1966–67	1,293	417	79	108	689
1965–66	1,133	368	57	107	601
1964–65	955	335	47	100	473
1963–64	1,013	398	47	90	478
1962–63	892	303	48	92	449
1961–62	857	293	60	81	423
1960–61	820	299	67	68	386
1959–60	773	241	67	80	385

Source: National Academy of Sciences: *Doctorate Recipients From United States Universities 1958–1966.* Publication 1489. Washington, D.C. 1967. Updated to 1967–68.

Table 136. EARNED DEGREES CONFERRED IN PSYCHOLOGY AT MASTERS LEVEL: 1959–60 THROUGH 1967–68

Year	Total	Clinical psychology	Counseling and guidance psychology [1]	Social psychology	All others
1967–68	3,482	177	200	28	3,077
1966–67	3,138	172	110	30	2,826
1965–66	2,530	108	84	11	2,327
1964–65	2,241	116	138	15	1,972
1963–64	2,059	126	243	18	1,672
1962–63	1,918	96	210	16	1,596
1961–62	1,832	97	194	31	1,510
1960–61	1,719	----	236	----	1,483
1959–60	1,406	----	----	----	----

[1] For master's degree-counseling and guidance prior to 1965–66.

Source: National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part A—Summary Data, 1967–68.* OE–54013A–68. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969. Also prior annual issues.

Table 137. LOCATION OF SCHOOLS CONFERRING MASTER'S DEGREES IN SELECTED FIELDS OF PSYCHOLOGY: 1966-67

Location	School	Clinical psychology	Counseling psychology	Social psychology
	Total, 38 schools	172	110	30
Connecticut	Connecticut College, New London	1	—	—
	University of Connecticut, Storrs	8	—	—
District of Columbia	Catholic University of America, Washington	7	2	—
Illinois	Bradley University, Peoria	14	—	—
	Illinois State University, Normal	—	8	—
	Loyola University, Chicago	16	4	4
	Southern Illinois University, Carbondale	—	17	—
Kentucky	University of Louisville, Louisville	4	—	—
Maine	University of Maine, Orono	1	—	—
Massachusetts	Boston College, Chestnut Hill	1	—	—
	Boston University, Boston	17	25	11
	Clark University, Worchester	3	—	—
	Harvard University, Cambridge	13	—	5
Michigan	University of Detroit, Detroit	8	—	—
	Wayne State University, Detroit	8	—	—
Minnesota	University of Minnesota, Minneapolis	2	—	—
Missouri	University of Missouri at Columbia, Columbia	9	—	—
	University of Missouri at Kansas City, Kansas City	—	—	1
Nevada	University of Nevada, Reno	—	—	1
New York	Adelphi University, Garden City	9	—	—
	Columbia University Teachers College, New York	5	—	—
	Cornell University, Ithaca	—	—	1
	Iona College, New Rochelle	—	29	—
	St. John's University, Jamaica	9	—	—
North Carolina	Duke University, Durham	3	—	—
	East Carolina University, Greenville	2	—	—
North Dakota	University of North Dakota, Grand Forks	—	11	—
Ohio	Miami University, Oxford	—	11	—
Oklahoma	University of Oklahoma, Norman	1	—	2
Pennsylvania	University of Pittsburgh, Pittsburgh	—	—	4
	Indiana University of Pennsylvania, Indiana	—	2	—
Rhode Island	University of Rhode Island, Kingston	9	—	—
Tennessee	George Peabody College for Teachers, Nashville	1	—	—
Texas	Baylor University, Waco	1	—	—
	Texas Technological College, Lubbock	1	—	—
Utah	University of Utah, Salt Lake City	4	1	1
Virginia	Richmond Professional Institute, Richmond	11	—	—
Washington	Eastern Washington State College, Cheney	4	—	—

Source: National Center for Educational Statistics: *Higher Education: Earned Degrees Conferred: Part B—Institutional Data, 1966–67*. OE-54013-67. Office of Education, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1968.

CHAPTER 28

Radiologic Technology

Radiologic technology involves the use of radiant energy in the field of medicine to assist the physician in the diagnosis and treatment of disease. The primary function of *radiologic technologists*—also called X-ray technologists or technicians—is to operate X-ray equipment under the general direction of a physician. For diagnostic purposes the technologist prepares the patient for radiographic examination or treatment, positions the patient between the X-ray tube and the film, selects the proper exposure, and takes X-ray photographs of parts of the body as prescribed by the physician. For therapeutic purposes the technologist operates special X-ray equipment and assists in the preparation of radium or radioactive materials for controlled application by the physician. The technologist may be responsible for keeping the equipment in working order, processing films, and recording the services performed.

About one-fourth of the technologists work in hospitals, while the remainder are employed in independent X-ray laboratories, multi-specialty clinics, in physicians' offices, and in government agencies. It is estimated that between 75,000 and 100,000 persons were employed either part time or full time as radiologic technologists in 1967 (table 138). Of this number 50 percent had one or more years of formal X-ray training (*50*).

The American Registry of Radiologic Technologists lists about 56,500 persons of whom an estimated two-thirds or about 37,900 are professionally active. The American Radiographic Technologists lists 5,600 active members.

A State distribution is available for the persons recognized by the American Registry of Radiologic Technologists (table 139). The three specialties within the field include the more generalized diagnostic X-ray technology, nuclear medicine technology using radioactive isotopes, and radiation therapy technology using radiation producing devices. The last two specialties were recognized by the Registry in 1962.

A license or certification to practice as an X-ray technologist is required in the States of California, New Jersey and New York, and the Commonwealth of Puerto Rico.

As of June 30, 1969, 1,152 programs in X-ray technology with an enrollment of more than 11,300 students had approval of the American Medical Association Council on Medical Education. These programs are conducted by hospitals, medical schools and by community colleges with hospital affiliation. The courses are open to high school graduates, although a few require 1 or 2 years of college or graduation from a school of nursing. The length of the training varies from a minimum of 2 years in a hospital radiology department, or a junior college offering an associate degree, to a 4-year university course leading to a bachelor's degree upon graduation.

Of the more than 1,100 approved schools of radiologic technology, more than 90 percent are hospital-based and conduct programs of at least 24 months. These not only provide general training in diagnostic X-ray technology, but also include a limited amount of training in the technology of radiation therapy. Some programs provide limited training in nuclear medicine technology. In the academic year 1968–69, the 1,073 reporting schools graduated 4,606 technologists (tables 140 and 141).

After completion of training in an AMA approved program, a technologist may take an examination given by The American Registry of Radiologic Technologists. Successful completion of the examination qualifies the technologist to use the title Registered Technologist—RT-(ARRT).

REFERENCES

(*50*) Division of Radiological Health: *National Conference on X-ray Technician Training.* Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1966.

Table 138. NUMBER OF ACTIVE RADIOLOGIC TECHNOLOGISTS AND TECHNICIANS: SELECTED YEARS, 1960 THROUGH 1968

Year	Active radiologic technologists		Year	Active radiologic technologists	
	Total	Registered [1]		Total	Registered [1]
1968		37,900	1965	70,000	28,000
1967	75,000–100,000	34,000	1960	60,000	27,000

[1] Persons who have passed the examination given by the American Registry of Radiologic Technologists.

Sources: Bureau of Health Professions Education and Manpower Training: *Health Manpower Source Book 20.* PHS Pub. No. 263 Section 20. National Institutes of Health, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1969.

American Registry of Radiologic Technologists.

Table 139. LOCATION OF REGISTERED RADIOLOGIC TECHNOLOGISTS: 1968 [1]

Location	X-ray technology	Nuclear medicine technology	Radiation therapy technology	Location	X-ray technology	Nuclear medicine technology	Radiation therapy technology
All locations	50,213	532	227	Missouri	1,195	19	7
				Montana	198	—	1
United States	50,165	532	226	Nebraska	472	6	2
				Nevada	142	1	—
Alabama	613	9	6	New Hampshire	263	—	—
Alaska	54	—	1	New Jersey	1,394	12	7
Arizona	440	7	3	New Mexico	215	1	—
Arkansas	425	1	—	New York	3,428	28	25
California	5,161	70	32	North Carolina	987	15	2
Colorado	932	19	4	North Dakota	186	2	—
Connecticut	1,122	6	8	Ohio	2,905	41	6
Delaware	150	—	—	Oklahoma	545	6	1
District of Columbia	158	2	2	Oregon	633	1	5
Florida	1,464	17	7	Pennsylvania	3,220	42	13
Georgia	874	12	5	Rhode Island	261	1	—
Hawaii	170	2	—	South Carolina	507	4	1
Idaho	177	—	4	South Dakota	199	—	1
Illinois	2,997	19	15	Tennessee	756	18	3
Indiana	1,305	8	6	Texas	2,519	35	3
Iowa	879	4	—	Utah	227	3	—
Kansas	699	6	2	Vermont	167	2	—
Kentucky	625	9	2	Virginia	949	13	5
Louisiana	750	7	3	Washington	850	2	3
Maine	314	3	—	West Virginia	422	3	—
Maryland	923	10	9	Wisconsin	1,584	15	9
Massachusetts	1,686	9	4	Wyoming	87	1	—
Michigan	2,056	28	12				
Minnesota	1,561	6	1	Canal Zone	16	—	1
Mississippi	319	7	1	Puerto Rico	32	—	—

[1] Includes active and inactive.

Source: The American Registry of Radiologic Technologists: *Directory of X-ray Technologists—Nuclear Medicine Technologists—Radiation Therapy Technologists.* Minneapolis, September 1968.

Table 140. ACCREDITED EDUCATIONAL PROGRAMS IN RADIOLOGIC TECHNOLOGY, STUDENTS AND GRADUATES: SELECTED YEARS, 1949–50 THROUGH 1968–69

Academic year	Programs	Students [1]	Graduates	Academic year	Programs	Students [1]	Graduates
1968–69	1,152	11,324	4,606	1962–63	755	6,944	2,722
1967–68	1,126	11,277	4,767	1961–62	718	6,231	2,315
1966–67	1,049	13,435	4,027	1960–61	673	5,512	—
1965–66	968	9,460	4,175	1959–60	609	4,581	2,285
1964–65	901	8,970	3,058	1955–56	422	2,613	1,966
1963–64	789	7,341	2,938	1949–50	267	1,447	923

[1] Students enrolled in 2-year programs or last 2 years of 3- or 4-year programs.

Sources: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago, American Medical Association. Annual issues. The American Society of Radiologic Technologists.

Table 141. LOCATION OF SCHOOLS OFFERING ACCREDITED PROGRAMS IN RADIOLOGIC TECHNOLOGY AND NUMBER OF STUDENTS AND GRADUATES: 1968–69

Location	School	Students	Graduates	Location	School	Students	Graduates
Total	[1] 1,073	11,324	4,606	Missouri	28	262	134
				Montana	7	49	21
Alabama	10	127	42	Nebraska	9	93	40
Alaska	—	—	—	Nevada	5	37	11
Arizona	7	46	20	New Hampshire	8	46	16
Arkansas	6	86	39	New Jersey	32	360	119
California	86	669	291	New Mexico	4	24	16
Colorado	15	219	94	New York	[2] 51	624	259
Connecticut	18	253	125	North Carolina	25	226	92
Delaware	1	24	6	North Dakota	8	58	24
District of Columbia	3	30	22	Ohio	71	821	321
Florida	24	344	107	Oklahoma	7	89	39
Georgia	18	237	88	Oregon	11	89	39
Hawaii	2	12	3	Pennsylvania	84	933	392
Idaho	5	35	12	Rhode Island	7	78	33
Illinois	[2] 61	600	248	South Carolina	[2] 14	142	69
Indiana	22	331	116	South Dakota	8	62	21
Iowa	21	213	92	Tennessee	14	210	89
Kansas	20	178	74	Texas	[2] 57	[3] 532	[3] 208
Kentucky	15	181	66	Utah	7	60	25
Louisiana	13	140	51	Vermont	3	59	29
Maine	9	120	52	Virginia	21	246	81
Maryland	15	260	122	Washington	12	105	41
Massachusetts	57	489	223	West Virginia	25	196	77
Michigan	48	494	156	Wisconsin	29	350	142
Minnesota	39	386	182	Wyoming	2	18	5
Mississippi	9	81	32				

[1] Of the total 1,152 schools approved as of June 1968, 79 did not submit 1968–69 reports. Of the 1,073 schools, 6 did not report on graduates, 132 reported none, 238 reported 1 or 2, and 697 reported 3 or more graduates.

[2] Includes 1 school that did not report on students and graduates.

[3] 1 armed services school has a 13-week didactic program, with 711 graduates; information on students and graduates not included.

Source: American Medical Association, Division of Medical Education, Department of Allied Medical Professions and Services.

CHAPTER 29

Secretarial and Office Services

Secretarial and office services are usually provided to physicians, dentists, optometrists, and other doctors in clinical practice through duties performed by *receptionists*, *secretaries*, *assistants*, and/or *aides*. Excluded from this category, however, are nurses and medical and dental laboratory personnel (technologists, technicians, and assistants), all of whom are considered in other chapters of this report.

Professional offices and admitting offices of hospitals and related institutions usually employ one or more persons to perform many and varied duties such as scheduling appointments, receiving patients, recording case histories, ushering the patient into the consultation or examination room, setting out the necessary instruments, and perhaps assisting the doctor by handing him instruments or performing other functions. There are also clerical duties involving correspondence, payments, monthly statements, supplies, insurance forms, and reports.

The person who prepares the examination room and hands instruments and materials to the doctor as directed is frequently called an *office assistant* or *aide* rather than a secretary. Medical assistants who perform laboratory services are included in chapter 7; dental assistants in chapter 8.

The receptionist's office procedures are closely related to those of the secretary. However, secretarial duties play a more important role in the secretary's job which often requires a knowledge of medical or dental terms.

High school graduation is the minimum educational requirement for secretarial and office services. Training in office procedures and skill in typing, shorthand, and bookkeeping improve opportunities for employment. Courses in biology, chemistry, health education, and medical (or dental) terminology as well as ethics and personal relations are desirable as part of the education of medical (and dental) secretaries. Formal programs are available in some community college and in technical or vocational schools, and are supplemented by training and experience on the job.

Information on the employment of secretaries and other office assistants by the more than 200,000 physicians in office-based practice is not available.

Some idea of the number of aides might be arrived at from information provided by *Medical Economics* (*51*). The January 22, 1968, issue of this journal reported from their new survey that most solo M.D.'s have either one full-time aide or none, while half of the two-man and three-man partnerships, and well over half of the four-man partnerships have at least two full-time aides per M.D. In this survey all full-time salaried office employees except physicians have been included as aides. When nurses and laboratory personnel are excluded, the average is probably about one employee per physician.

The American Association of Medical Assistants reported 13,000 members as of December 1968. Included are receptionists, secretaries, assistants, nurses, and technicians employed in the offices of Doctors of Medicine and in accredited hospitals.

The employment of *dental secretaries and receptionists* by nonsalaried dentists was reported by the American Dental Association (*52*) as follows:

Employment status	*1962*	*1965*	*1968*
Full-time workers	13,600	20,900	25,200
Part-time workers	5,900	4,200	5,400

According to the NCHS survey of optometrists, 12,000 secretaries and/or receptionists, and about 4,000 to 5,000 *optometric assistants* were employed by optometrists in 1968. The Optometric Extension Program Foundation, Inc., enrolls approximately 1,400 optometric assistants annually in 2-day workshops. Of this number, some 950 persons are enrolled annually in 4-week inservice study courses for optometric assistants.

Other doctors in private practice as well as hospitals and related institutions also employ persons to provide secretarial and office services. The total number of secretarial and office personnel employed in 1968 was approximately 250,000 to 275,000. In 1960 the census reported 157,000 receptionists and secretaries employed in the health services industry (table 2, Introduction).

REFERENCES

(51) Owens, A.: *How many aides, how much to pay them.* Medical Economics. January 1968.

(52) American Dental Association, Bureau of Economic Research and Statistics: *1968 survey of dental practice, IV, professional expenses; auxiliary personnel. J. Am. Dent. A.* 78(6): 1355, June 1969. Also the 1962 and 1965 survey.

CHAPTER 30

Social Work

Social work programs designed to meet the special needs of persons who are ill, disabled, aged, or crippled are one component of the many types of services concerned with the serious social problems of individuals and families. Of the estimated 130,000 *social workers* employed in social welfare settings in the United States in 1967, approximately 20,200 were found in health and related programs. The number of these persons in health programs increased to an estimated 22,700 persons in 1968 (table 142).

According to a 1960 nationwide study of salaries and working conditions of social welfare manpower, approximately 4,500 persons were employed in medical settings and 7,200 in psychiatric settings. Three-fourths of these social workers were engaged in programs whose primary purpose was to provide health services—in hospitals and their outpatient departments, in clinics which are independent of hospitals but provide outpatient diagnosis and other services, and in public health departments and voluntary organizations not centered in hospitals and clinics (table 143). More recent studies present selected characteristics of an estimated 5,800 social work staff who were in general and tuberculosis hospitals in 1964 (table 144) and on 7,500 social workers employed in approximately 2,500 mental health establishments in 1963 (*53*).

The 1966 PHS-AHA survey of hospitals indicated that 10,700 social workers were employed in hospitals. A 1967 survey conducted by the American Hospital Association revealed that about 30 percent of the hospitals in the United States had social service departments (*54*).

Social workers in hospitals and clinics work directly with patients and their families in helping them to cope with problems related to severe or long term illness, recovery, and rehabilitation. They also contribute an understanding of significant social and emotional factors related to a patient's health problems and thus assist physicians and other health workers in the evaluation and treatment of the individual. They utilize community health agencies and other resources to assist the patient in adjustment to disability and to life in the community. In public health settings and in community mental health centers, social workers with skills in research, consultation, administration, and community organizational methods are being utilized in programs to develop conditions supportive of physical and mental health.

By the end of 1968, seven States had enacted laws to protect the title of social worker from being assumed by persons without qualifications as identified by the States; they are California, Illinois, New York, Oklahoma, Rhode Island, South Carolina, and Virginia. Puerto Rico requires a license to practice social work.

In most fields of practice, the educational requirement for full professional status is a master's degree, which requires completion of 2 years of graduate study in an accredited school of social work. It is estimated of the total number of social workers employed, about one out of five meet this requirement. In 1960, the proportion was considerably higher in the health field—over half of the workers employed in medical settings had a master's degree (*55*). A 1968 National Institute of Mental Health survey of mental health facilities indicated that 2 percent of social workers employed in these facilities had a doctoral degree, and an additional 70 percent had a master's degree (*56*).

In 1968, 64 graduate schools of social work in the United States were accredited by the Council on Social Work Education. An additional 13 recently established schools were working towards accreditation. In November 1968, 11,154 full-time students were enrolled of whom 10,847 were in the master's degree program and 307 were in the post-master's degree program (tables 145 and 146).

Nearly, 800 colleges and universities offer courses with social welfare content at the undergraduate level. Of these, 224 are affiliated with the Council on Social Work Education. The Council is also developing training programs in social

welfare for social work technicians. These programs when developed and implemented will lead to associate degrees in 2 year colleges. In 1966–67, 1,881 bachelor's degrees were identified with social work, social administration, or social welfare as the major subject (table 3, Introduction).

Many of these students go directly to graduate schools of social work, but more than half of them enter social welfare employment. In some settings, the service offered can be so delineated that selective use is made of social workers with graduate social work education; social workers with baccalaureate degrees and in-service training in social work; and social welfare aides or ancillary personnel. In medical and psychiatric settings, persons with baccalaureate degrees are more apt to be classified as *social work assistants*. These assistants receive additional on-the-job training in social work tasks under the supervision of a graduate social worker. The 1966 PHS-AHA survey indicated that 1,500 social work assistants were employed in hospitals.

Membership in the National Association of Social Workers (NASW)—50,501 individuals at the close of 1968—is open only to graduates and students of accredited graduate professional schools of social work. Persons employed in health and related programs may identify with two of the nine councils—2,810 members of the Medical and Health Services Council, or 6,200 members of the Mental Health and Psychiatric Services Council.

Eligibility requirements for membership in the Academy of Certified Social Workers are 2 years of membership in the NASW and 2 years of paid social work employment under the supervision of a member of the Academy. The Academy was founded in 1961 and had 34,011 members at the beginning of 1969.

REFERENCES

(*53*) National Institute of Mental Health: Selected characteristics of social workers. *Mental Health Manpower Current Statistical and Activities Report*, No. 6. Public Health Service, U.S. Department of Health, Education, and Welfare, May 1965.

(*54*) American Hospital Association: Hospitals Guide Issue, Part 2. *J.A.H.A.* Chicago, August 1968.

(*55*) Stewart, W. H., Pennell, M. Y., and Smith, L. M.: Medical and psychiatric social workers. *Health Manpower Source Book 12*. PHS Pub. No. 263, Sec. 12. Public Health Service, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1961.

(*56*) National Institute of Mental Health: *Mental Health Facility Report*, Series A, Number 6. (In press).

Table 142. SOCIAL WELFARE WORKERS INCLUDING THOSE EMPLOYED IN HEALTH AND RELATED PROGRAMS: SELECTED YEARS, 1950 THROUGH 1968

Year	Total social welfare workers (estimated)	Persons employed in health and related programs			Year	Total social welfare workers (estimated)	Persons employed in health and related programs		
		Total	Medical settings	Psychiatric settings			Total	Medical settings	Psychiatric settings
1968	----	22,700	7,700	15,000	1963	----	15,000	5,500	9,500
1967	130,000	20,200	7,200	13,000	1960	105,000	11,700	4,500	7,200
1965	125,000	17,500	6,300	11,200	1950	----	6,200	3,200	3,000

Sources: 1950—U.S. Department of Labor, Bureau of Labor Statistics: *Social Workers in 1950. A Report on the Study of Salaries and Working Conditions in Social Work*. New York. American Association of Social Workers, Inc., 1950.

1960—U.S. Department of Labor, Bureau of Labor Statistics; National Social Welfare Assembly, Inc.; and U.S. Department of Health, Education, and Welfare: *Salaries and Working Conditions of Social Welfare Manpower in 1960*. New York. National Social Welfare Assembly, Inc., 1961.

1965—Departmental Task Force on Social Work Education and Manpower: *Closing the Gap in Social Work Manpower*. Pub. No. 0–795–440. Office of the Undersecretary, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, 1966.

1967—National Commission for Social Work Careers, National Association of Social Workers: *Manpower, A Community Responsibility, 1968 Annual Review*. New York, 1968.

1963, 1965, 1967, 1968—Public Health Service estimates of persons in health and related programs.

Table 143. ESTIMATED NUMBER OF FULL-TIME PERSONNEL SPECIALIZING IN MEDICAL AND PSYCHIATRIC SOCIAL WORK BY TYPE OF PROGRAM AND EMPLOYING AGENCY: 1960

Type of program	All agencies	State or local agencies					National agencies				
		Total	Government			Voluntary	Total	Federal			Voluntary
			Total	Public health	Other			Total	Public health	Other	
	Total medical and psychiatric social workers										
All programs	11,701	9,956	5,523	1,009	4,514	4,433	1,745	1,575	131	1,444	170
Health programs	8,601	6,960	4,411	1,009	3,402	2,549	1,641	1,493	131	1,362	148
Hospitals and their OPD	5,593	4,403	2,863	3	2,860	1,540	1,190	1,058	76	982	132
Independent clinics [1]	2,080	1,691	1,007	531	476	684	389	385	8	377	4
Other health programs [2]	928	866	541	475	66	325	62	50	47	3	12
Other programs	3,100	2,996	1,112	—	1,112	1,884	104	82	—	82	22
Rehabilitation services [3]	837	802	244	—	244	558	35	23	—	23	12
Public assistance	232	232	230	—	230	2	—	—	—	—	—
Other family services	544	540	31	—	31	509	4	—	—	—	4
Child welfare work	642	642	240	—	240	402	—	—	—	—	—
Teaching social work	205	205	66	—	66	139	—	—	—	—	—
Other programs [4]	640	575	301	—	301	274	65	59	—	59	6
	Medical social workers										
All programs	4,494	3,752	1,880	277	1,603	1,872	742	590	80	510	152
Health programs	3,430	2,720	1,421	277	1,144	1,299	710	574	80	494	136
Hospitals and their OPD	2,646	2,078	1,104	1	1,103	974	568	444	53	391	124
Independent clinics	321	219	97	64	33	122	102	102	2	100	—
Other health programs	463	423	220	212	8	203	40	28	25	3	12
Other programs	1,064	1,032	459	—	459	573	32	16	—	16	16
	Psychiatric social workers										
All programs	7,207	6,204	3,643	732	2,911	2,561	1,003	985	51	934	18
Health programs	5,171	4,240	2,990	732	2,258	1,250	931	919	51	868	12
Hospitals and their OPD	2,947	2,325	1,759	2	1,757	566	622	614	23	591	8
Independent clinics	1,759	1,472	910	467	443	562	287	283	6	277	4
Other health programs	465	443	321	263	58	122	22	22	22	—	—
Other programs	2,036	1,964	653	—	653	1,311	72	66	—	66	6

[1] Clinics which are independent of hospitals that provide outpatient diagnosis and treatment of the sick.

[2] In public health departments and voluntary health organizations, in programs not centered in hospitals and clinics.

[3] Rehabilitation services of hospitals, clinics, sheltered workshops, rehabilitation centers, and other settings.

[4] Includes work with adult offenders, institutional care for the aged, other services to individuals or families, and community organization.

Source: Stewart, W. H., Pennell, M. Y., and Smith, L. M.: Medical and psychiatric social workers. *Health Manpower Source Book 12.* PHS Pub. No. 263, Sec. 12. Public Health Service, U.S. Department of Health, Education and Welfare. Washington. U.S. Government Printing Office, 1961. Based on 1960 Bureau of Labor Statistics survey, including unpublished data.

Table 144. SOCIAL WORK STAFF IN GENERAL AND TUBERCULOSIS HOSPITALS: 1964

Type, ownership, and size of hospital	Total hospitals	Hospitals with social work staff		Estimated number of social work staff		Estimated number of graduate social workers	
		Number	Percent	Total	Per hospital with staff	Total	Percent of social work staff
All hospitals	**6,595**	**1,219**	**18**	**5,822**	**4.8**	**3,960**	**68**
Voluntary	4,514	678	15	2,560	3.8	1,754	69
State and local government	1,679	330	20	2,094	6.3	1,201	57
Federal Government	402	211	52	1,168	5.5	1,005	86
General short-term hospitals	**6,055**	**930**	**15**	**4,803**	**5.2**	**3,354**	**70**
Voluntary	4,290	575	13	2,158	3.8	1,504	70
Under 100 beds	2,561	75	3	162	2.2	110	68
100–199 beds	849	92	11	230	2.5	150	65
200–299 beds	460	157	34	386	2.5	224	58
300–399 beds	235	126	54	468	3.7	318	68
400 beds and over	185	125	68	912	7.3	702	77
State and local government	1,394	174	12	1,642	9.4	999	61
Under 200 beds	1,205	45	4	139	3.1	67	48
200–399 beds	107	59	55	364	6.2	226	62
400 beds and over	82	70	85	1,139	16.3	706	62
Federal Government	371	181	49	1,003	5.5	851	85
Under 200 beds	218	42	19	94	2.2	61	65
200–399 beds	66	55	83	220	4.0	163	74
400 beds and over	87	84	97	689	8.2	627	91
General long-term hospitals	**343**	**189**	**55**	**799**	**4.2**	**501**	**63**
Voluntary	202	98	49	386	3.9	239	62
State and local government	121	71	59	276	3.9	135	49
Federal Government	20	20	100	137	6.8	127	93
Tuberculosis hospitals	**197**	**100**	**51**	**220**	**2.2**	**105**	**48**
Voluntary	22	5	23	16	3.2	11	69
State and local government	164	85	52	176	2.1	67	38
Federal Government	11	10	91	28	2.8	27	96

Source: Pennell, M. Y. and Cooney, J. Jr.: Social Service Departments in Hospitals—1954 and 1964. *Hospitals*: Journal of the American Hospital Association, 41:88. Mar. 16, 1967.

Table 145. ACCREDITED SCHOOLS OF SOCIAL WORK, STUDENTS AND GRADUATES: SELECTED YEARS, 1952–53 THROUGH 1968–69

Academic year	Schools	Enrollment in master's program		Students taking specified field of instruction		Awards granted for completion of program		Doctorate
		1st year	2d year	Medical	Psychiatric	2 years (master's degrees)	Certificate beyond 2 years	
1968-69	64	5,753	[1] 5,094	871	2,140	4,614	19	67
1967-68	64	5,527	4,651	930	2,094	4,279	32	54
1966-67	63	5,082	4,253	754	2,050	3,693	33	56
1965-66	60	4,506	3,682	720	1,938	3,206	21	39
1962-63	56	3,255	2,608	568	1,402	2,318	29	30
1957-58	53	2,308	1,743	[2] 201	[2] 836	1,612	19	20
1952-53	53	2,138	1,806	----------	----------	1,946	13	8

[1] An additional 307 students were in the post-master's degree program.
[2] 2nd year students only.

Source: Council on Social Work Education: *Statistics on Social Work Education: November 1, 1968, and Academic Year 1967-1968*. New York. 1968. Also prior annual publications. Data for United States and Puerto Rico.

Table 146. LOCATION AND OWNERSHIP OF ACCREDITED SCHOOLS OFFERING MASTER'S PROGRAMS IN SOCIAL WORK AND NUMBER OF STUDENTS AND GRADUATES: 1968

Location	School	Ownership	Students	Graduates
	Total, 64 schools		10,847	4,614
Ariz	Arizona State University, Tempe	Public	87	28
Calif	Fresno State College, Fresno	do	135	51
	Sacramento State College, Sacramento	do	115	20
	San Diego State College, San Diego	do	202	82
	University of California, Berkeley	do	330	148
	University of California, Los Angeles	do	135	71
	University of Southern California, Los Angeles	Private	161	70
Colo	University of Denver, Denver	do	197	93
Conn	University of Connecticut, Hartford	Public	170	53
D.C	Catholic University of America, Washington	Private	115	63
	Howard University, Washington	do	181	99
Fla	Florida State University, Tallahassee	Public	200	99
Ga	Atlanta University, Atlanta	Private	122	58
	Georgia State College, Atlanta	Public	116	23
Hawaii	University of Hawaii, Honolulu	do	110	45
Ill	Loyola University, Chicago	Private	136	56
	University of Chicago, Chicago	do	374	163
	University of Illinois, Urbana	Public	294	86
Ind	Indiana University, Indianapolis	do	121	54
Iowa	University of Iowa, Iowa City	do	96	35
Kans	University of Kansas, Lawrence	do	95	56
Ky	University of Louisville, Louisville	do	120	57
La	Louisiana State University, Baton Rouge	do	164	48
	Tulane University, New Orleans	Private	234	82

See footnotes at end of table.

Table 146. LOCATION AND OWNERSHIP OF ACCREDITED SCHOOLS OFFERING MASTER'S PROGRAMS IN SOCIAL WORK AND NUMBER OF STUDENTS AND GRADUATES: 1968—Con.

Location	School	Ownership	Students	Graduates
Md	University of Maryland, Baltimore	Public	223	64
Mass	Boston College, Boston	Private	138	60
	Boston University, Boston	do	192	45
	Simmons College, Boston	do	113	57
	Smith College, Northampton	do	141	66
Mich	Michigan State University, East Lansing	Public	80	48
	University of Michigan, Ann Arbor	do	472	228
	Wayne State University, Detroit	do	222	130
Minn	University of Minnesota, Minneapolis	do	119	44
Mo	St. Louis University, St. Louis	Private	139	57
	University of Missouri, Columbia	Public	107	49
	Washington University, St. Louis	Private	176	88
Nebr	University of Nebraska, Lincoln	Public	76	35
N.J	Rutgers, The State University, New Brunswick	do	166	102
N.Y	Adelphi University, Garden City	Private	167	74
	City University of New York, Hunter College, New York	Public	234	104
	Columbia University, New York	Private	420	194
	Fordham University, New York	do	235	104
	New York University, New York	do	272	143
	State University of New York, SUNY at Buffalo, Buffalo	Public	172	62
	Syracuse University, Syracuse	Private	129	45
	Yeshiva University, New York	do	90	34
N.C	University of North Carolina, Chapel Hill	Public	136	63
Ohio	Case Western Reserve University, Cleveland	Private	213	82
	Ohio State University, Columbus	Public	156	62
Okla	University of Oklahoma, Norman	Public	107	57
Oreg	Portland State College, Portland	do	95	28
Pa	Bryn Mawr College, Bryn Mawr	Private	99	41
	University of Pennsylvania, Philadelphia	do	187	75
	University of Pittsburgh, Pittsburgh	Public	211	98
Tenn	University of Tennessee, Nashville	do	175	77
Tex	Our Lady of the Lake College, San Antonio	Private	92	48
	University of Texas, Austin	Public	108	37
Utah	University of Utah, Salt Lake City	do	202	70
Va	Richmond Professional Institute, Richmond	do	126	37
Wash	University of Washington, Seattle	do	273	109
W.Va	West Virginia University, Morgantown	do	90	41
Wis	University of Wisconsin, Madison	do	137	79
	University of Wisconsin, Milwaukee	do	165	80
P.R	University of Puerto Rico, Rio Piedras	Public	182	56

Source: Council on Social Work Education: *Statistics on Social Work Education: November 1, 1968, and Academic Year 1967–1968*. New York. Annual publication.

CHAPTER 31

Specialized Rehabilitation Services

Several kinds of therapists, each with a specific area of knowledge and skill which may be adapted to the overall purpose of rehabilitation, may be employed to help the person who is physically or mentally disabled to regain as much capacity for self-help and independent living as possible. Information on occupational therapists and on physical therapists is presented in other chapters of this report. The specialists considered here are listed below, with estimates of the numbers of workers employed in 1968.

Occupation:	*Number employed*
Corrective therapist	1,000–1,200
Educational therapist	500
Manual arts therapist	900
Music therapist	2,200
Recreation therapist	4,000–5,000
Homemaking rehabilitation consultant	300

Thus the active manpower in these specialized rehabilitation services ranged between 8,900 and 10,100.

The five kinds of therapists listed above are members of the rehabilitation team which is headed by a physician. They follow specific treatment aims prescribed by the attending physician. Their employment is concentrated in hospitals, institutions, and rehabilitation centers, usually those operated by the Veterans' Administration (VA) shown in table 147. They are also employed in schools with programs which utilize these specialized services.

The homemaking consultant may serve as a resource person for the rehabilitation team or provide direct counseling with handicapped individuals. Such consultants are likely to be employed by the Federal Extension Service or State departments of health, welfare, or vocational rehabilitation. Relatively few work for private health institutions, centers, or agencies.

Corrective Therapist

Corrective therapy is the treatment of patients by medically prescribed physical exercises and activities designed to strengthen and coordinate functions and to prevent muscular deconditioning resulting from long convalescence or inactivity due to illness. Corrective therapy is a prescribed service employed in the more advanced stages of rehabilitation in which functional training is required. The corrective therapist treats all diagnostic categories of patients on the prescription of a physician. He uses assistive, resistive, and active exercises, and in addition, may instruct patients in the use of orthopedic and prosthetic appliances.

Corrective therapist is the usual title used by those persons who work in hospitals, nursing homes, and rehabilitation centers, while those employed in educational institutions are known as *adapted physical educators*. The American Corrective Therapy Association, Inc. (600 members) estimates that corrective therapists (C.T.) numbered between 1,000 and 1,200 in 1968 compared with 700 in 1950 and 700 to 800 in 1965. A recent survey of the ACTA membership indicated that 40 percent are engaged in private practice with only 11 percent on a full-time basis (*57*). Adapted physical educators (A.P.E.) may have numbered between 3,000 and 4,000 individuals. The Veterans' Administration employs the largest number of personnel specifically identified as corrective therapists.

The recommended educational and clinical experience program for the corrective therapist qualifies the person for responsibilities in a hospital, nursing convalescent home, clinic, or educational institution. The minimum educational requirement is a baccalaureate in physical education from an accredited school, followed by a period of clinical training involving 400 to 600 hours in an approved affiliated hospital.

Eastern Washington State College in Cheney, Washington is the only school fully accredited by The American Corrective Therapy Association. This program offers 1 year of graduate study following a baccalaureate program in physical education. Training centers are affiliated with 63 VA hospitals with 95 individuals trained in 1968.

The American Corrective Therapy Association is concerned with standards of education and clinical training. The American Board for Certification of Corrective Therapists is a component of the American Corrective Therapy Association, Inc. The Board passes on the qualifications of therapists and maintains a national register of those entitled to use the identification of a Certified Corrective Therapist (C.C.T.). By the end of 1968, more than 1,000 therapists had been certified.

Educational Therapist

Educational therapy is the utilization of academic teaching designed to develop the mental and physical capacities of hospitalized patients. The *educational therapist* (E.T.) administers medical treatment through the use of educational activities that are of significance to the patient. The instruction given at various educational levels may be accredited by recognized school authorities.

The educational therapist is a college graduate who has majored in education or physical education. In addition, 2 to 7 months of clinical training are required, either as inservice training or at certain training centers affiliated with professional schools. In 1968, 5 persons received clinical training at VA hospitals. No information is available on graduate degrees awarded in educational therapy.

The American Association for Rehabilitation Therapy with 300 members in 1968 represents both educational and manual arts therapists. Employed E.T.'s numbered about 150 in 1950, increasing to about 500 in 1965 and staying at about that level in 1968.

Manual Arts Therapist

Manual arts therapy is the professional use of industrial arts activities of vocational significance to assist in the restoration of patients to their fullest capacities within the limits of their abilities. The *manual arts therapist* administers a program of actual or simulated work situations that help the patient to prepare for an early return to family life and become a productive member of the community.

The number of manual arts therapists employed in hospitals and centers may have exceeded 900 in 1968, according to the American Association for Rehabilitation Therapy. In 1950, the number was probably one-third of the current supply.

The minimum qualification for employment is a college education, with a major in industrial arts, agriculture, or a related field. The degree is followed by a period of 2 to 7 months of clinical training, usually given as inservice training or at hospitals or rehabilitation centers affiliated with professional schools.

In 1968, 39 persons received clinical training at VA centers. A total of 37 schools in 1968 offered clinical training programs in manual arts and industrial therapy (table 148). No information is available on graduate degrees awarded in manual arts therapy.

Music Therapist

The professional application of the art of music for therapeutic purposes is relatively new and has a wider application in the treatment of mental illness than in physical illness. The *music therapist* uses instrumental or vocal music to bring about changes in behavior that can serve as a basis for improved mental and physical health. To do this, the trained music therapist follows the specific treatment aims prescribed by a physician.

Approximately 800 hospitals and similar institutions employ music therapists. A few public schools also include music therapy in their special education for exceptional children. In 1968, about 2,200 music therapists were employed, 912 of whom were members of the National Association for Music Therapy, Inc. In 1950, employed M.T.'s numbered about 700.

The music therapy staff is usually made up of a department head or director who holds a master's degree in music therapy, plus staff members who may have a master's or bachelor's degree in music therapy or in some other area of music. The music therapist usually works directly with the patient or client, but they are also called upon to act as a consultant or supervisor in planning services for community agencies.

Music majors may qualify by taking courses in music therapy. A baccalaureate in music therapy is offered by 17 schools, with 69 graduates in 1968–69 (tables 149 and 150). A master's degree program is offered by five universities. One university offers a doctoral program in which the individual may select a major in music therapy.

For employment as a qualified music therapist, the college graduate must complete a 6-month

internship in an approved psychiatric hospital which is affiliated for clinical training with one of the approved schools.

The National Association for Music Therapy, Inc. maintains a national registry for those who have successfully completed the course work at any of the 17 approved schools offering the baccalaureate degree. Persons on the register are entitled to use the identification of a Registered Music Therapist (R.M.T.). By the end of 1968, more than 430 music therapists had been registered.

Recreation Therapist

Therapeutic recreation is a specialized service within the rehabilitation process concerned with the care and treatment of the disabled, ill, handicapped, and aged person. A wide variety of programs are used in therapeutic recreation, since individuals differ in their needs and interest. The elements of service commonly provided include: music, art, drama, sports, games, camping, outdoor and nature activities, cooking, sewing, hobbies, social clubs, and committees.

The *therapeutic recreation specialist*, also known as the *recreation therapist*, recreator, or adjunctive therapist, uses a program which is ordinarily associated with leisure as part of the care and treatment for people with physical and psychological handicaps, illnesses or conditions.

The number of persons employed as therapeutic recreation specialists in both private and governmental agencies, has increased from about 1,200 in 1959 to between 4,000 to 5,000 in 1968, as estimated by the National Therapeutic Recreation Society.

The 1966 PHS-AHA survey indicated that 3,800 recreation therapists were employed in hospitals. This estimate probably includes recreation therapy aides.

In 1966, the National Recreation and Park Association (20,000 members) was founded from a merger of several organizations. The following year, the National Therapeutic Recreation Society was formed as a branch of the Association with over 1,000 members. In addition, there are persons employed in the therapeutic recreational field who are not members of the society.

The therapeutic recreation service staff is usually comprised of a director who holds a master's degree in recreation, plus staff members who may have a master's or bachelor's degree in therapeutic recreation or recreation, or in one of the activity specialties. Most therapeutic recreation staff give services directly to clients, but they also act as consultants to health or community agencies and function as supervisors, administrators, educators, and researchers, depending on the setting in which they work.

The National Therapeutic Recreation Society (NTRS) maintains a national registry for persons employed in therapeutic recreation. Five levels have been established depending upon education and experience. To date, the NTRS has registered over 300 persons. However, these figures do not reflect the total number of such personnel, since many States have separate registration plans which are not reported nationally.

In 1968, 114 colleges offered courses leading to a B.S. degree in recreation. These colleges graduated over 1,000 with a bachelor's degree, 300 with a master's and 20 with doctorates. A baccalaureate in therapeutic recreation is offered by 28 schools, a master's degree program by 25, and a doctor's degree program by 8 (table 151). Many States and other agencies offer stipends to encourage graduate study, and traineeships are available from the Rehabilitation Services Administration (RSA).

The National Therapeutic Recreation Society is currently developing a certification program to recognize facilities which meet standards for field work training of professional students in therapeutic recreation. Thus far, five institutions have been certified.

The therapeutic recreational specialists may have the help of a *therapeutic recreation assistant* or *aide* in carrying out the program of rehabilitating patients in community and hospital programs. Three community colleges are known to be offering 2-year programs for the training of assistants (table 152).

Homemaking Rehabilitation Consultant

The specialist with a home economics background and training in occupational therapy can adapt the knowledge of home management, family finance, nutrition, and other home-related subjects to meet the needs of the handicapped person who has housekeeping responsibilities. The *homemaking rehabilitation consultant* may offer direct retraining in homemaking competencies to individuals or indirect counseling as a resource person for the rehabilitation team.

Rehabilitation of the physically handicapped in homemaking activities is of particular concern to the American Home Economics Association (AHEA). This Association administers traineeships provided by the Rehabilitation Services Administration (RSA) for home economists to study towards a master's or doctor's degree in the area of rehabilitation. In 1968–69, there were 15 trainees. Since the initiation of the program in 1963, a total of 75 persons have been awarded traineeships (table 153).

Homemaking rehabilitation consultants are college graduates, usually with an educational background in home economics or occupational therapy, followed by inservice or graduate training in the special education of the physically or mentally handicapped. Prior professional work experience may be in such fields as occupational therapy, physical therapy, dietetics or nutrition, or home economics. Practical experience in homemaking and child care is needed.

According to AHEA-RSA estimates, the number of persons employed as homemaking rehabilitation consultants in 1968 numbered about 300.

REFERENCE

(57) A Report To The Congress: *Personnel Qualifications For Medicare Personnel.* Office of the Secretary, U.S. Department of Health, Education, and Welfare. Washington. U.S. Government Printing Office, Dec. 1968.

Table 147. THERAPISTS EMPLOYED BY THE VETERANS' ADMINISTRATION AND NUMBER OF VA TRAINEES: 1965 AND 1968

Occupation	VA employees				Training center affiliations of VA hospitals 1968	Trainees in VA hospitals during calendar year 1968
	Dec. 31, 1965		Dec. 31, 1968			
	Therapist	Assistant	Therapist	Assistant		
Total	[1] 2,774	[2] 910	[3] 2,562	[3] 966	270	1,065
Corrective therapists	500	41	468	50	63	95
Educational therapists	156	13	132	10	18	5
Manual arts therapists [4]	390	314	370	344	57	39
Occupational therapists	501	287	438	268	36	505
Physical therapists	572	255	513	294	52	407
Recreational therapists, including music	655	----	641	----	44	14

[1] Includes 30 part-time employees.
[2] Includes 10 part-time employees and excludes 28 general therapists.
[3] Includes part-time employees.
[4] Includes industrial therapists.

Source: Veterans' Administration, Department of Medicine and Surgery, Reports and Statistics Service and Education Service.

Table 148. LOCATION OF SCHOOLS OFFERING CLINICAL TRAINING PROGRAMS IN MANUAL ARTS AND INDUSTRIAL THERAPY: 1968

Location	Schools	Location	Schools
	Total, 37 schools [1]	N.Y.	New York University, New York.
			State College for Teachers, Buffalo.
Ala.	University of Alabama, University		State College for Teachers, Oswego.
Ariz.	Arizona State College, Flagstaff	N.C.	North Carolina State College, Raleigh.
Ark.	Arkansas State College, Conway	N.Dak.	State Normal and Industrial College, Ellendale.
Conn.	Central Connecticut State College, New Britain.		State University of North Dakota, Grand Forks.
Ill.	Northern Illinois University, De Kalb.	Ohio	Kent State University, Kent.
	Southern Illinois University, Carbondale.	Pa.	Millersville State College, Millersville.
Ind.	Ball State College, Muncie.		State Teachers College, California.
Kan.	Kansas State College, Pittsburgh.	R.I.	Rhode Island College, Providence.
	Kansas State Teachers College, Emporia.	S.Dak.	Northern State Teachers College, Aberdeen.
La.	Northwestern State College, Natchitoches.	Tenn.	East Tennessee State College, Johnson City.
Me.	Gorham State Teachers College, Gorham.		Memphis State College, Memphis.
Mass.	Fitchburg State Teachers College, Fitchburg.	Tex.	Agricultural and Mechanical College of Texas, College Station.
Minn.	State College, Moorhead.		University of Houston, Houston.
	State Teachers College, St. Cloud.	Va.	Virginia Polytechnic Institute, Blacksburg.
	University of Minnesota, Minneapolis.	W.Va.	University of West Virginia, Morgantown.
Miss.	Mississippi Southern College, Hattiesburg.		West Virginia Institute of Technology, Montgomery.
Neb.	Nebraska State Teachers College, Peru.	Wis.	Stout State College, Menomonie.
N.H.	Keene Teachers College, Keene.		

[1] Data not available on number of students and graduates enrolled in these courses. All schools are publicly owned.

Source: American Association for Rehabilitation Therapy, Inc.

Table 149. INSTITUTIONS OFFERING MUSIC THERAPY PROGRAMS AND GRADUATES: SELECTED YEARS, 1949–50 THROUGH 1968–69

Academic year	Bachelor's degree		Master's degree		Internship [1]	
	Schools	Graduates	Schools	Graduates	Institutions	Graduates
1968–69	17	69	5	9	35	60
1967–68	13	63	5	7	34	56
1966–67	12	58	5	6	32	52
1965–66	11	52	5	4	31	48
1964–65	11	47	5	4	30	48
1963–64	11	31	5	2	28	38
1962–63	12	26	5	2	24	29
1961–62	8	18	5	3	20	20
1960–61	8	15	5	3	20	18
1959–60	7	13	5	4	18	17
1954–55	7	6	5	2	15	8
1949–50	3	4	2	3	10	7

[1] 6-month internship in an approved psychiatric hospital which is affiliated for clinical training with one of the approved schools. These internships are open to college graduates with a baccalaureate in music therapy and to music majors who have taken courses in music therapy.

Source: National Association for Music Therapy, Inc.

Table 150. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING MUSIC THERAPY PROGRAMS AND NUMBER OF GRADUATES: 1968–69

Location	School	Ownership	Graduates		
			Bachelor's	Master's	Internship
	Total, 17 schools		69	9	60
Calif	University of the Pacific, Stockton	Private	7	—	6
Fla	Florida State University, Tallahassee	Public	7	2	6
	University of Miami, Coral Gables	Private	—	—	—
Ga	University of Georgia, Athens	Public	—	—	—
Ind	Indiana University, Bloomington	do	6	—	6
Kans	University of Kansas, Lawrence [1]	do	9	4	9
La	Loyola University, New Orleans	Private	8	1	7
Mich	Michigan State University, East Lansing	Public	8	2	7
	Western Michigan University, Kalamazoo	do	3	—	2
Mo	Lincoln University, Jefferson City	do	2	—	3
N.J	Montclair State College, Upper Montclair	do	—	—	—
N.C	East Carolina University, Greensville	do	—	—	—
Ohio	Ohio University, Athens	do	4	—	3
Oreg	Willamette University, Salem	do	1	—	1
Tex	Texas Women's University, Denton	do	4	—	3
Wis	Alverno College, Milwaukee	Private	6	—	4
	University of Wisconsin, Milwaukee	Public	4	—	3

[1] Also offers a doctoral program in music education with music therapy as a major area of study.

Source: National Association for Music Therapy, Inc.

Table 151. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING THERAPEUTIC RECREATION PROGRAMS: 1969

Location	School	Ownership	Bachelor's degree	Master's degree	Doctor's degree
	Total, 36 schools		28	25	8
Calif	Department of Recreation, Chico State College, Chico, California.	Public	X		
	Department of Recreation, San Diego State College, San Diego.	do	X	X	
	Department of Recreation, San Fernando Valley State College, Northridge.	do	X		
	Department of Recreation, San Jose State College, San Jose	do	X	X	
	Department of Recreation, University of California, Los Angeles.	do		X	
	Department of Recreation Education, California State College at Los Angeles, Los Angeles.	do	X	X	
	Department of Recreation Education, San Francisco State College, San Francisco.	do		X	
Fla	Recreation Curriculum, Florida State University, Tallahassee.	do	X	X	
Ga	Division of Health, Physical Education and Recreation, Georgia Southern College, Statesboro.	do	X		
	Division of Parks and Recreation, University of Georgia, Athens.	do	X	X	

Table 151. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING THERAPEUTIC RECREATION PROGRAMS: 1969—Continued

Location	School	Ownership	Bachelor's degree	Master's degree	Doctor's degree
Ill	Department of Parks and Recreation, University of Illinois, Urbana.	Public	X	X	X
	Department of Recreation, Southern Illinois University, Carbondale.	do	X	X	
Ind	Department of Recreation, Indiana State University, Terre Haute.	do		X	
	Department of Recreation and Park Administration, Indiana University, Bloomington.	do	X		
Iowa	Recreation Leadership Program, University of Iowa, Iowa City.	do	X	X	
Ky	Division of Recreation, University of Kentucky, Lexington.	do	X		
	Recreation Curriculum, Eastern Kentucky University, Richmond.	do	X		
La	Department of Recreation, Grambling College, Grambling.	Private	X		
Md	Department of Recreation, University of Maryland, College Park.	Public	X	X	
Mass	School of Education, Boston University, Boston	Private		X	X
Minn	Department of Recreation and Park Administration, University of Minnesota, Minneapolis.	Public	X	X	
Miss	Department of Recreation, University of Southern Mississippi, Hattiesburg.	Private	X	X	
Nebr	Department of Health, Physical Education and Recreation, Nebraska Wesleyan University, Lincoln.	do	X		
	Department of Recreation, University of Nebraska at Omaha, Omaha.	Public	X		
N.Mex	Department of Recreation, University of New Mexico, Albuquerque.	do	X	X	X
N.Y	Recreation Division, Program in Recreation and Related Community Service, Teachers College, Columbia University, New York.	Private		X	X
	School of Education, New York University, New York.	do		X	X
N.C	Recreation Administration Curriculum, University of North Carolina, Chapel Hill.	Public		X	
Ohio	Department of Recreation, Central State University, Wilberforce.	do	X		
	Recreation Curriculum, Kent State University, Kent.	do	X		
Oreg	Department of Recreation and Park Management, University of Oregon, Eugene.	do	X	X	
Pa	Department of Recreation, Temple University, Philadelphia.	do	X	X	X
	Department of Recreation and Parks Program, The Pennsylvania State University, University Park.	do	X	X	
Tex	Recreation Curriculum, Texas Woman's University, Denton.	do	X	X	X
Utah	Division of Recreation, University of Utah, Salt Lake City.	do	X	X	
Wis	Recreation Curriculum, University of Wisconsin, Madison.	do		X	X

Source: National Recreation and Park Association: *Study of Therapeutic Recreation Education, Society of Park and Recreation Educators*, 1969.

Table 152. LOCATION AND OWNERSHIP OF SCHOOLS FOR THERAPEUTIC RECREATIONAL ASSISTANTS: 1968

Location	School [1]	Ownership
Calif.	Division of Physical and Recreational Education, Golden Gate College, Huntington Beach.	Public
Conn.	Department of Health, Physical Education and Recreation, Northwestern Connecticut Community College, Winstead.	do.
N.Y.	Recreation Curriculum, State University of New York, Farmingdale	do.

[1] Information not available on numbers of students and graduates.

Source: National Recreation and Park Association: *Institutions of Higher Learning with Curriculums in Parks and/or Recreation*, 1968.

Table 153. HOMEMAKING REHABILITATION CONSULTANT TRAINEESHIPS: 1963–64 THROUGH 1968–69

Academic year	Traineeships [1]	Academic year	Traineeships [1]
1968–69	15	1965–66	10
1967–68	15	1964–65	10
1966–67	15	1963–64	10

[1] Persons receiving Rehabilitation Services Administration traineeships in the field of homemaking rehabilitation.

Source: U.S. Department of Health, Education, and Welfare, Social and Rehabilitation Service, Rehabilitation Services Administration, Division of Training.

CHAPTER 32

Speech Pathology and Audiology

Speech pathologists and audiologists are primarily concerned with disorders in the production, reception, and perception of speech and language. They help to identify persons who have such disorders and to determine the etiology, history, and severity of specific disorders through interviews and special tests. They facilitate optimal treatment through speech, hearing, and language remedial or conservational procedures, counseling, and guidance. They also make appropriate referrals for medical or other professional attention.

Trends in numbers of speech pathologists and audiologists are indicated by the growth of membership in the American Speech and Hearing Association (ASHA). Membership increased from about 1,800 in 1950, to 3,700 in 1955; 6,200 in 1960; and to 12,200 in 1968 (table 154). However, more than 1,500 of the ASHA members were students and not employed.

Approximately 17,000 persons were employed as speech pathologists and audiologists in 1968, the large majority of whom are members of the association. Of the 9,867 active ASHA members responding to a 1968 survey, almost half were employed in elementary or secondary schools. As would be expected, a large majority of the membership are engaged in clinical work—either diagnostic or therapeutic (table 155).

Two Certificates of Clinical Competence are awarded by ASHA, one in speech pathology and one in audiology. Both require academic training at the master's degree level, 1 year of experience in the field, and the passing of a national examination. At the close of 1968, 4,952 persons held Certificates of Clinical Competence in speech pathology, and 964 in audiology.

A total of 264 schools offer programs in speech pathology and audiology. Of these, 73 offer training only at the preprofessional level (bachelor's degree); 136 offer the master's degree; and 55 award a doctorate. In the academic year 1968–69, about 6,000 degrees were awarded (tables 156 and 157).

Table 154. LOCATION OF SPEECH PATHOLOGISTS AND AUDIOLOGISTS WHO ARE MEMBERS OF THE AMERICAN SPEECH AND HEARING ASSOCIATION: 1968

Location	Members	Location	Members
All locations	[1] 12,201	Missouri	270
		Montana	43
United States	12,008	Nebraska	108
		Nevada	25
Alabama	100	New Hampshire	26
Alaska	17	New Jersey	433
Arizona	80	New Mexico	58
Arkansas	35	New York	1,266
California	1,465	North Carolina	118
Colorado	285	North Dakota	65
Connecticut	241	Ohio	555
Delaware	26	Oklahoma	161
District of Columbia	141	Oregon	170
Florida	299	Pennsylvania	652
Georgia	168	Rhode Island	40
Hawaii	45	South Carolina	51
Idaho	30	South Dakota	18
Illinois	839	Tennessee	174
Indiana	282	Texas	544
Iowa	224	Utah	85
Kansas	218	Vermont	24
Kentucky	88	Virginia	2[illegible]
Louisiana	191	Washington	2[illegible]
Maine	28	West Virginia	48
Maryland	323	Wisconsin	302
Massachusetts	289	Wyoming	18
Michigan	556		
Minnesota	245	Foreign	193
Mississippi	59		

[1] A 1966 survey indicates that perhaps as many as one-fifth of these persons are not active in the profession.

Source: American Speech and Hearing Association: *1969 Directory*. Washington.

Table 155. PLACE OF EMPLOYMENT AND PROFESSIONAL ACTIVITY OF MEMBERS OF THE AMERICAN SPEECH AND HEARING ASSOCIATION: 1968

Characteristic	Number	Percent	Characteristic	Number	Percent
Total respondents	[1] 11,401	100.0	Professional activity		
Active in profession	9,867	86.6	Total active in profession	9,867	100.0
Not active in profession	1,534	13.4			
			Clinical (therapy and/or diagnosis)	6,671	67.6
Student	473	4.1	Supervision of clinical activity	489	5.0
Not Employed	1,061	9.3	Teaching subject matter to communicatively handicapped	276	2.8
Place of employment			Teaching in college or university	1,224	12.4
Total active in profession	9,867	100.0	Administration	558	5.7
			Research	290	2.9
College or university	2,202	22.3	Other	359	3.6
Elementary or secondary school	4,659	47.3			
Speech and hearing center not in college or university	1,857	18.8			
Other	1,149	11.6			

[1] An additional 800 persons did not respond.

Source: Fricke, J. E., Bruber, E. J. and Watts, P. A.: The 1968 membership of ASHA—survey results. *ASHA*, A Journal of the American Speech and Hearing Association. August 1969.

Table 156. SCHOOLS OFFERING PROGRAMS IN SPEECH PATHOLOGY AND AUDIOLOGY AND ESTIMATED NUMBER OF GRADUATES: SELECTED YEARS, 1953–54 THROUGH 1968–69

Academic year	Schools	Graduates				Academic year	Schools	Graduates			
		Total	Bachelor's degree	Master's degree	Doctor's degree			Total	Bachelor's degree	Master's degree	Doctor's degree
1968–69 [1]	264	5,997	3,823	1,992	182	1961–62	194	2,503	1,893	545	67
1967–68	271	5,331	3,441	1,744	146	1960–61	204	2,259	1,662	502	95
1966–67 [2]	247	4,726	3,163	1,419	144	1959–60 [2]	-------	2,193	1,630	481	82
1965–66 [2]	247	4,163	2,840	1,183	140	1958–59	193	1,935	1,458	421	56
1964–65	240	3,688	2,568	1,020	100	1957–58	-------	1,694	1,281	359	54
1963–64	-------	3,293	2,416	776	101	1953–54	-------	955	662	260	33
1962–63	194	3,133	2,322	730	81						

[1] Estimated.

[2] Revised estimates.

Source: The status of professional training in speech pathology and audiology—1963. *ASHA*, A journal of the American Speech and Hearing Association. 5(12): 865–1001. December 1963. Updated by the Association.

Table 157. LOCATION OF SCHOOLS OFFERING PROGRAMS IN SPEECH PATHOLOGY AND AUDIOLOGY: 1968–69

Location [1]	Schools	Highest degree offered			Location [1]	Schools	Highest degree offered		
		Bachelor's	Master's	Doctor's			Bachelor's	Master's	Doctor's
Total	264	73	136	55	Missouri	11	6	3	2
					Montana	1	—	1	—
Alabama	3	1	2	—	Nebraska	3	1	1	1
Arizona	2	—	2	—	Nevada	1	1	—	—
Arkansas	2	1	1	—	New Hampshire	1	1	—	—
California	23	4	17	2	New Jersey	7	1	6	—
Colorado	5	—	3	2	New Mexico	3	—	3	—
Connecticut	2	—	1	1	New York	24	5	14	5
District of Columbia	5	1	4	—	North Carolina	6	2	4	—
Florida	5	2	1	2	North Dakota	3	1	2	—
Georgia	2	—	1	1	Ohio	9	1	3	5
Hawaii	1	—	1	—	Oklahoma	8	2	5	1
Idaho	1	—	1	—	Oregon	6	3	2	1
Illinois	13	5	5	3	Pennsylvania	10	3	3	4
Indiana	4	—	2	2	South Carolina	1	1	—	—
Iowa	4	2	1	1	South Dakota	3	2	1	—
Kansas	5	—	2	3	Tennessee	5	—	3	2
Kentucky	5	4	—	1	Texas	15	3	11	1
Louisiana	11	6	3	2	Utah	3	—	2	1
Maine	1	—	1	—	Vermont	1	—	1	—
Maryland	5	2	1	2	Virginia	4	3	—	1
Massachusetts	4	—	3	1	Washington	8	3	4	1
Michigan	9	1	4	4	West Virginia	2	—	2	—
Minnesota	5	2	2	1	Wisconsin	8	3	4	1
Mississippi	3	—	2	1	Wyoming	1	—	1	—

[1] No schools in Alaska, Delaware, and Rhode Island.

Source: American Speech and Hearing Association.

CHAPTER 33

Veterinary Medicine

Veterinary medicine is the health profession concerned with the prevention, cure, and alleviation of disease and injury in animals. The profession is also vitally concerned with the protection of human health by the prevention and control of diseases transmissible from animals to man, by employment in the regulatory and public health aspects of veterinary medicine, and by the discovery of new knowledge through research.

Veterinarians treat sick and injured animals, give advice regarding the care and breeding of animals, and help prevent the outbreak and spread of diseases among them by physical examination, tests, and vaccinations.

Veterinarians employed in the regulatory and public health aspects of veterinary medicine assist in the provision of safe meat and dairy products. They also help to shield the human population from over 100 animal diseases which may affect man, such as brucellosis, leptospirosis, psittacosis, rabies, and tuberculosis. In laboratory animal medicine they serve human health by providing specially bred and cared for experimental animals for research projects dealing with human health problems. Some medical schools employ veterinarians as full-time staff members in teaching and research.

The number of veterinarians in the United States has increased from 15,800 in 1950 to nearly 26,400 in 1968 (table 158). Included in the count are Federal and non-Federal veterinarians in active practice as well as those who are retired or not in practice. Probably 25,000 (95 percent) are currently active in their profession.

Of the veterinarians reporting to the American Veterinary Medical Association in 1967, 63 percent were in private practice. In private practice, they treat large and small domestic animals. About 9 percent worked in the regulatory and public health aspects of veterinary medicine for Federal, State, or local governments. An additional number were in the military or other types of practice (table 159).

Veterinary medical specialty organizations recognized by the American Veterinary Medical Association are: American Board of Veterinary Public Health (120 specialists); American Board of Veterinary Radiology (26); American Board of Veterinary Toxicology (13); American College of Laboratory Animal Medicine (113); American College of Veterinary Microbiologists (102); American College of Veterinary Pathologists (230); and American College of Veterinary Surgeons (51).

A license is required for the practice of veterinary medicine in all States and the District of Columbia. To obtain a license, an applicant must be a graduate of an approved veterinary school and pass a State board examination. Oregon also requires some practical experience under the supervision of a licensed veterinarian.

For some positions in public health, research, laboratory animal medicine, or teaching, the master's or Ph.D. degree in a field such as pathology, public health, or microbiology is required, in addition to the degree of Doctor of Veterinary Medicine (D.V.M. or V.M.D.).

The minimum time required to earn the D.V.M. or V.M.D. is 6 years beyond high school. This period consists of 2 to 4 years of undergraduate college curriculums and 4 years of veterinary medicine in one of the 18 approved schools. In the academic year 1968–69, there were 4,779 students enrolled, of whom 1,129 were expected to graduate that year (tables 160 and 161).

Some graduates of foreign veterinary schools serve as interns and residents in this country and then establish practice here.

Table 158. LOCATION OF VETERINARIANS AND MEMBERSHIP STATUS IN THE AMERICAN VETERINARY MEDICAL ASSOCIATION: DECEMBER 31, 1968

Location	Total veterinarians [1]	AVMA members	Non-members	Location	Total veterinarians [1]	AVMA members	Non-members
United States	26,391	18,911	7,480	Missouri	801	559	242
				Montana	192	148	44
Alabama	455	295	160	Nebraska	513	330	183
Alaska	18	15	3	Nevada	82	65	17
Arizona	233	170	63	New Hampshire	84	74	10
Arkansas	216	137	79	New Jersey	557	445	112
California	2,568	1,897	671	New Mexico	149	119	30
Colorado	603	445	158	New York	1,623	1,153	470
Connecticut	244	210	34	North Carolina	415	309	106
Delaware	78	61	17	North Dakota	100	74	26
District of Columbia	119	98	21	Ohio	1,265	864	401
Florida	821	589	232	Oklahoma	435	311	124
Georgia	605	399	206	Oregon	327	235	92
Hawaii	51	42	9	Pennsylvania	1,046	734	312
Idaho	177	133	44	Rhode Island	44	29	15
Illinois	1,368	1,004	364	South Carolina	197	137	60
Indiana	856	613	243	South Dakota	232	166	66
Iowa	1,288	868	420	Tennessee	366	261	105
Kansas	640	452	188	Texas	1,593	1,095	498
Kentucky	351	271	80	Utah	141	95	46
Louisiana	299	208	91	Vermont	85	68	17
Maine	100	79	21	Virginia	544	398	146
Maryland	608	498	110	Washington	639	433	206
Massachusetts	377	319	58	West Virginia	93	65	28
Michigan	973	721	252	Wisconsin	692	469	223
Minnesota	824	541	283	Wyoming	90	67	23
Mississippi	214	143	71				

[1] Includes active and inactive veterinarians.

Source: American Veterinary Medical Association.

Table 159. TYPE OF PRACTICE OF VETERINARIANS: DECEMBER 31, 1967

Type of practice	Number	Percent	Type of practice	Number	Percent
Total veterinarians	25,466	100.0	Regulatory veterinary medicine	1,734	6.8
			Veterinary public health	485	1.9
Private practice	16,065	63.1	Military veterinary services	816	3.2
			Other including laboratory		
Large animal	1,760	6.9	services	4,233	16.6
Small animal	5,788	22.7			
Mixed	8,517	33.4	Retired, not in practice,		
			or status not reported	2,133	8.4
Other practice	7,268	28.5			

Source: American Veterinary Medical Association.

Table 160. VETERINARY MEDICAL SCHOOLS, STUDENTS, AND GRADUATES: SELECTED YEARS, 1949–50 THROUGH 1968–69

Academic year	Schools	Students	Graduates[1]	Academic year	Schools	Students	Graduates[1]
1968–69	18	4,779	1,129	1962–63	18	3,632	830
1967–68	18	4,623	1,064	1961–62	18	3,528	819
1966–67	18	4,388	963	1960–61	18	3,497	824
1965–66	18	4,119	910	1959–60	18	3,464	826
1964–65	18	3,874	877	1954–55	17	3,419	817
1963–64	18	3,7[illegible]	834	1949–50	17	3,132	695

[1] Senior students.

Source: Department of Education and Licensure: *J.A.V.M.A.* 154(5). Chicago. American Veterinary Medical Association, March 1969. Also prior annual issues.

Table 161. LOCATION AND OWNERSHIP OF SCHOOLS OF VETERINARY MEDICINE AND NUMBER OF STUDENTS AND GRADUATES: 1968–69

Location	School	Ownership	Students	Graduates[1]
	Total, 18 schools		4,779	1,129
Ala	Auburn University School of Veterinary Medicine, Auburn	Public	386	90
	Tuskegee Institute School of Veterinary Medicine, Tuskegee	Private	120	30
Calif	University of California School of Veterinary Medicine, Davis	Public	307	70
Colo	Colorado State University College of Veterinary Medicine, Fort Collins.	do	286	60
Ga	University of Georgia School of Veterinary Medicine, Athens	do	247	58
Ill	University of Illinois College of Veterinary Medicine, Urbana	do	273	70
Ind	Purdue University School of Veterinary Science and Medicine, Lafayette.	do	226	52
Iowa	Iowa State University College of Veterinary Medicine, Ames	do	291	65
Kans	Kansas State University School of Veterinary Medicine, Manhattan.	do	315	75
Mich	Michigan State University College of Veterinary Medicine, East Lansing.	do	277	45
Minn	University of Minnesota College of Veterinary Medicine, St. Paul.	do	239	60
Mo	University of Missouri School of Veterinary Medicine, Columbia.	do	220	47
N.Y	State University of New York, Veterinary College at Cornell University, Ithaca.	do	231	58
Ohio	Ohio State University College of Veterinary Medicine, Columbus.	do	317	73
Okla	Oklahoma State University College of Veterinary Medicine, Stillwater.	do	183	41
Pa	University of Pennsylvania School of Veterinary Medicine, Philadelphia.	Private	290	65
Tex	Texas A. & M. University College of Veterinary Medicine, College Station.	Public	380	[2] 123
Wash	Washington State University College of Veterinary Medicine, Pullman.	do	191	47

[1] 4th-year students.

[2] 3d-year students under trimester system.

Source: Department of Education and Licensure: *J.A.V.M.A.* 154(5). Chicago. American Veterinary Medical Association, March 1969.

CHAPTER 34

Vocational Rehabilitation Counseling

Rehabilitation services are required to help persons with physical or mental disabilities to return as fully as possible to normal living. Primary concern with repairing or compensating for the damage of illness or accident rests with the physician who may have the help of a variety of other health workers. For vocational guidance, training, and placement, however, the major responsibility rests with the rehabilitation counselor.

The vocational *rehabilitation counselor* is concerned with evaluating the vocational potential of the client with a suitable job when the time comes for starting work—either in his former position or in the one for which job training or retraining becomes a part of rehabilitation. Some counselors specialize in services for the blind, the deaf, the mentally ill, the mentally retarded, or other specific groups. They not only provide counseling, but engage in community activities to interest employers in hiring qualified handicapped persons and others in the benefits of rehabilitation.

All 50 States have rehabilitation programs financed jointly by Federal and State funds. About 8,100 rehabilitation counselors were employed in these State programs at the close of 1968 (table 162). They are based in the agencies' headquarters or district offices, in mental hospitals, rehabilitation centers, rehabilitation workshops, and other special settings.

In addition, an estimated 3,000 rehabilitation counselors were employed in 1968 in Veterans' Administration hospitals and in other public and private hospitals, in special schools, and in voluntary health agencies and other organizations with rehabilitation interests.

The minimum educational requirement for employment as a rehabilitation counselor is generally a bachelor's degree, preferably with a major in psychology, social welfare, or education. Specialized graduate education is open to college graduates who have had some education or experience in rehabilitation counseling or in such related fields as vocational guidance, personnel work, or social work. Probably about 70 percent of the 11,000 rehabilitation counselors currently employed have had some graduate training. Perhaps 30 percent of these were trained in rehabilitation counseling.

In 1968–69, 71 universities offered graduate programs in rehabilitation counseling (tables 163 and 164). The graduate programs generally require 1½ to 2 academic years for a master's degree and an additional 2 or 3 years for a doctorate. The courses include human behavior and personality functioning, medical aspects of disability, counseling principles and techniques, information on occupations, methods of developing job resources for the disabled and community resources in rehabilitation. In 1968, 1,018 persons were awarded graduate degrees (or certificates) in rehabilitation counseling.

Table 162. VOCATIONAL REHABILITATION COUNSELORS: SELECTED YEARS, 1950 THROUGH 1968

Year	Estimated number of counselors	Employed in State VR programs	Employed in hospitals, schools, or other settings [1]	Year	Estimated number of counselors	Employed in State VR programs	Employed in hospitals, schools, or other settings [1]
1968	11,100	8,100	3,000	1960	3,000	2,000	1,000
1967	[2] 9,700	[2] 7,200	2,500	1955	1,800	1,200	600
1965	6,200	4,200	2,000	1950	1,500	1,000	500

[1] Includes those employed by voluntary health agencies and other organizations with rehabilitation interests.
[2] Revised.

Sources: U.S. Department of Health, Education, and Welfare, Social and Rehabilitation Service, Rehabilitation Services Administration, Division of Training.

U.S. Department of Health, Education, and Welfare, Social and Rehabilitation Service, Rehabilitation Services Administration, Division of Statistics and Studies: *Rehabilitation Servic Series* No. 69-2, Supplement 15. March 1969. and No. 68-2, Supplement 16 March, 1968.

Table 163. SCHOOLS OFFERING GRADUATE TRAINING PROGRAMS IN REHABILITATION COUNSELING, STUDENTS AND GRADUATES: SELECTED YEARS, 1949-50 THROUGH 1968-69

Academic year	Schools	Students	Graduates	Academic year	Schools	Students	Graduates
1968-69	71	1,972	1,018	1962-63	33	738	281
1967-68	68	1,684	[1] 800	1961-62	32	646	231
1966-67	65	1,359	638	1960-61	34	565	241
1965-66	39	1,140	559	1959-60	29	566	243
1964-65	39	954	467	1954-55	4	43	5
1963-64	34	857	415	1949-50	3	----------	----------

[1] Estimated.

Source: U.S. Department of Health, Education, and Welfare, Social and Rehabilitation Service, Rehabilitation Services Administration, Division of Training. Data for United States and Puerto Rico.

Table 164. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING GRADUATE TRAINING PROGRAMS IN REHABILITATION COUNSELING AND NUMBER OF STUDENTS AND GRADUATES: 1968–69

Location	School [1]	Ownership	Students	Graduates [2]
	Total, 71 institutions		1,972	1,018
Ala	Auburn University, Auburn	Public	14	4
	University of Alabama, University	do	42	27
Ariz	University of Arizona, Tucson	do	41	21
Ark	Arkansas State University, State College	do	—	2
Calif	California State College at Los Angeles, Los Angeles	do	71	33
	Sacramento State College, Sacramento	do	13	—
	San Diego State College, San Diego	do	16	8
	San Francisco State College, San Francisco	do	57	29
	University of Southern California, Los Angeles	Private	7	—
Colo	Colorado State College, Greeley	Public	67	60
Conn	University of Connecticut, Storrs	do	10	5
D.C	George Washington University, Washington	Private	—	—
Fla	Florida State University, Tallahassee	Public	33	21
	University of Florida, Gainesville	do	60	34
Ga	Georgia State College, Atlanta	do	10	—
	University of Georgia, Athens	do	68	29
Ill	DePaul University, Chicago	Private	22	10
	Illinois Institute of Technology, Chicago	do	24	4
	Southern Illinois University, Carbondale	Public	63	37
	University of Illinois, Urbana	do	21	9
Ind	Indiana University, Bloomington	do	22	10
Iowa	State University of Iowa, Iowa City	do	35	12
Kans	Kansas State Teachers College, Emporia	do	15	8
Ky	University of Kentucky, Lexington	do	24	15
La	Northwestern State College of Louisiana, Natchitoches	do	—	—
	University of Southwestern Louisiana, Lafayette	do	3	—
Md	University of Maryland, College Park	do	22	12
Mass	Assumption College, Worcester	Private	—	—
	Boston University, Boston	do	34	24
	Springfield College, Springfield	do	26	9
Mich	Michigan State University, East Lansing	Public	73	27
	Wayne State University, Detroit	do	23	15
Minn	Mankato State College, Mankato	do	19	5
	St. Cloud State College, St. Cloud	do	—	3
	University of Minnesota, Minneapolis	do	43	13
Miss	Mississippi State University, State College	do	15	40
Mo	University of Missouri, Columbia	do	34	7
Mont	East Montana College, Billings	do	—	—
Nebr	University of Nebraska, Lincoln	do	10	2
N.J	Seton Hall University, South Orange	Private	27	23
N.Mex	University of New Mexico, Albuquerque	Public	—	—
N.Y	Columbia University, New York	Private	51	34
	Hofstra University, Hempstead	do	10	—
	Hunter College of the City University of New York, New York	Public	21	9
	New York University, New York	Private	62	31
	State University of New York at Albany, Albany	Public	15	—
	State University of New York at Buffalo, Buffalo	do	54	23
	Syracuse University, Syracuse	Private	46	10
N.C	East Carolina University, Greenville	Public	6	1
	University of North Carolina, Chapel Hill	do	13	—
N.Dak	University of North Dakota, Grand Forks	do	—	—

See footnotes at end of table.

Table 164. LOCATION AND OWNERSHIP OF SCHOOLS OFFERING GRADUATE TRAINING PROGRAMS IN REHABILITATION COUNSELING AND NUMBER OF STUDENTS AND GRADUATES: 1968-69—Continued

Location	School [1]	Ownership	Students	Graduates [2]
Ohio	Bowling Green State University, Bowling Green	Public	15	11
	Kent State University, Kent	do	47	89
	University of Cincinnati, Cincinnati	do	15	4
Okla	Oklahoma State University, Stillwater	do	20	10
Oreg	University of Oregon, Eugene	do	54	12
Pa	Pennsylvania State University, University Park	do	60	31
	Temple University, Philadelphia	do	10	—
	University of Pittsburgh, Pittsburgh	do	44	30
	University of Scranton, Scranton	Private	33	11
S.C	University of South Carolina, Columbia	Public	28	5
Tenn	University of Tennessee, Knoxville	do	21	9
Tex	Texas Technological University, Lubbock	do	42	18
	University of Texas, Austin	do	28	9
Utah	University of Utah, Salt Lake City	do	21	7
Va	Virginia Commonwealth University, Richmond	do	44	23
Wash	University of Washington, Seattle	do	27	12
W.Va	West Virginia University, Morgantown	do	45	25
Wis	The University of Wisconsin, Madison	do	25	8
	The University of Wisconsin, Milwaukee	do	23	19
P.R	University of Puerto Rico, Rio Piedras	do	28	19

[1] Institutions receiving Rehabilitation Services Administration training grants in the field of rehabilitation counseling.

[2] Master's degree in rehabilitation counseling or certificate to those with a master's degree in a related field.

Source: U.S. Department of Health, Education, and Welfare; Social and Rehabilitation Service, Rehabilitation Services Administration, Division of Training.

CHAPTER 35

Miscellaneous Health Services

The physician's associate, physician's assistant, physician's aide, inhalation therapy technician, electrocardiograph technician, electroencephalograph technician, and a variety of other assistants for patient care are discussed in this chapter. For other emerging occupations there is insufficient occupational identification or data to permit assessment of their supply.

Physician's Associate

The physician's associate performs certain specified tasks under the direction and supervision of a physician. The associate is responsible for scheduling physical examinations and immunizations and treating minor ailments and injuries, and other related activities associated with child care. Frequently, the associate is employed in a pediatric practice (*58*).

The physician's associate is a college graduate or has graduate education, and has received specialized training in order to work with physicians in clinical or research endeavors.

Four year courses of study are presently being developed at Duke University Medical Center in Durham, University of Texas Medical Branch at Galveston, and the Alderson-Broadduo College and Hospital at Philippi, West Virginia. A Child Health Associate program is being developed at the University of Colorado Medical Center in Denver (*59*).

Physician's Assistant

The physician's assistant also performs certain specified tasks under the direction and supervision of a physician. The assistant may draw blood, give intravenous infusions and medication, perform tissue biopsies, as well as other routine procedures classically performed by physicians or nurses. Preparation for a physician's assistant position requires 2 years of specialized training in a college or university leading to the Associate Degree. Presently programs are underway at eight institutions to prepare assistants for physicians (*59*).

Physicians and Other Aides

Assistants or aides are identified according to the hospital service in which they work. For example, *physicians aides*, also called *surgical aides*, *obstetrical aides*, *surgical technical aides* or *pediatric aides*, work as a member of the surgical team under the direction and continuous supervision of the physician and/or nurse. They assist in the care of patients in the operation room, delivery room, or emergency room and perform tasks associated with maintaining aseptic conditions essential for patient care. The surgical technical aide also helps set up the operating room with the surgical instruments and equipment needed for each operation; assists in the care, preparation, and maintenance of sterile and nonsterile supplies and equipment; and assists in the handling and sterilization of instruments and equipment. Almost 18,000 surgical technical aides were employed in hospitals in 1966 (table 165).

Most surgical aides are high school graduates who have received at least 3 months of in-service training in hospitals. A few vocational schools and community colleges in conjunction with cooperating hospitals now offer a program of 1 year or longer duration, leading to a certificate. A community college curriculum for surgical aides is being developed under the aegis of the Association of Operating Room Nurses. There is no association that represents persons employed in this capacity.

There are also *community health aides*, *ambulance attendants* or *aides*, and others involved in health services.

Inhalation Therapy Technician

The *inhalation therapy technician*, often called an *inhalation therapist*, uses skills and equipment to attempt to restore the respiratory system to its normal function. In small hospitals this service may be provided by the regular nursing staff. In larger institutions, however, the inhalation therapy department may consist of from one to 20 or more technicians working full time under medical

supervision in administering treatments, maintaining an adequate supply of oxygen and good equipment, and keeping accurate records.

The majority of inhalation therapy technicians work under the direct supervision of the anesthesiology department or the pulmonary department of hospitals. The PHS-AHA survey of manpower resources in hospitals referred to in the introduction indicates that almost 5,600 inhalation therapists were employed in hospitals as of April 1966. Others work for firms that provide emergency oxygen service, for clinics, or for municipal organizations.

The number of persons employed as inhalation therapists in 1968 was almost 8,000. The American Association for Inhalation Therapy reports 5,300 members. A registry of those persons who have qualified through oral and written examinations is maintained by the American Registry of Inhalation Therapists; 688 persons were registered as of December 1, 1968.

As of March 1969, 55 schools offered approved programs for inhalation therapy technicians, in accordance with minimal standards initiated in 1963. Courses of study that are no less than 9 months in length include academic instruction and supervised clinical experience. The courses are open to high school graduates and graduates of a school of nursing. While the majority of the schools are hospital based, colleges are becoming increasingly interested in the education of inhalation therapy technicians (tables 166 and 167).

Electrocardiograph Technician

Electrocardiography involves recording the changes of electrical potential occurring during the heartbeat by use of an electrocardiograph (ECG or EKG) machine. It is used in diagnosing abnormalities in heart action or recording the progress of patients with heart conditions, as well as providing follow up for those patients receiving cardiotoxic medications. The electrocardiograph technician operates the machine and gives the recorded tracings to physicians who are qualified in cardiology for analysis and interpretation.

In 1968 between 6,000 and 7,000 *electrocardiograph technicians* were employed in this country, with the great majority in the cardiology service of hospitals. They perform in a laboratory or at the patient's bedside if the patient cannot be moved. The technician attaches electrodes to various parts of the patient's body and moves the chest electrodes to successive positions across the patient's chest, obtaining several different tracings of the heart action by the ECG machine.

No specialized formal education is required for these auxiliaries. However, high school graduation with courses in the physical sciences and some college work are desirable. On-the-job training in a hospital usually lasts from 3 to 6 months, under the supervision of an experienced technician or cardiologist.

Electroencephalograph Technician

Electroencephalography involves the detecting, measuring, and recording of brain waves by the use of an electroencephalograph (EEG) machine. It is of great importance in the evaluation and treatment of patients with various types of brain disease or trauma. The *electroencepahlograph technician* is trained to use the machine to record brain waves. These tracings are interpreted by a physician usually a neurologist, with training in electroencephalography, or by a highly select group of board-certified electroencephalographers with Ph.D. degrees.

An estimated 2,000 to 3,000 electroencephalograph technicians were employed full or part time in 1968. They usually work in the neurology service of a large hospital. However, some give tests in a physician's private office.

The EEG technician may take on-the-job training in a hospital EEG department, generally serving an apprenticeship lasting 3 to 6 months with some programs lasting 6 to 12 months. This practical experience may be supplemented by lectures on neuroanatomy, neurophysiology, and electronics. A minimum background of high school science courses and an aptitude for working with complicated electrical equipment are needed. Formal training programs are being developed in a number of universities and hospitals (table 168). For some of these programs a minimum of 2 years of college preparation is required prior to admission.

National professional societies include the American Society of Electroencephalographic Technologists (ASET) which was organized in 1960 and now reports 636 active and associate members. This count includes many but not all of the members from the regional societies.

An American Board of Registration of Electroencephalographic Technologists (ABRET) was established in 1964. To date, 89 persons have been

registered upon satisfactory completion of the written and oral examinations. A certificate of registration entitles the technician to the use of the designation R. EEG T.

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Table 165. LOCATION OF SURGICAL TECHNICAL AIDES EMPLOYED IN HOSPITALS IN RELATION TO POPULATION: 1966

Location	Number employed	Rate per 100,000 population	Location	Number employed	Rate per 100,000 population
United States	[1] 17,623	9	Missouri	450	10
			Montana	99	14
Alabama	364	10	Nebraska	162	11
Alaska	44	19	Nevada	40	9
Arizona	107	7	New Hampshire	49	7
Arkansas	168	9	New Jersey	363	5
California	1,618	9	New Mexico	116	12
Colorado	137	7	New York	1,381	8
Connecticut	193	7	North Carolina	407	8
Delaware	38	8	North Dakota	66	11
District of Columbia	151	19	Ohio	747	7
Florida	578	10	Oklahoma	318	13
Georgia	449	10	Oregon	126	6
Hawaii	46	7	Pennsylvania	794	7
Idaho	47	7	Rhode Island	78	9
Illinois	914	9	South Carolina	295	12
Indiana	454	9	South Dakota	96	14
Iowa	432	16	Tennessee	497	13
Kansas	287	13	Texas	1,216	12
Kentucky	296	9	Utah	110	11
Louisiana	329	9	Vermont	25	6
Maine	150	16	Virginia	363	8
Maryland	356	10	Washington	341	11
Massachusetts	451	8	West Virginia	195	10
Michigan	764	9	Wisconsin	336	8
Minnesota	349	10	Wyoming	44	14
Mississippi	168	7			

[1] Estimates for 7,000 AHA registered hospitals based on 5,300 returns in PHS-AHA survey.

Sources: U.S. Department of Health, Education, and Welfare, Public Health Service, Bureau of Health Manpower and the American Hospital Association: *Manpower Resources in Hospitals—1966.* Chicago. American Hospital Association, 1967.

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Table 166. APPROVED PROGRAMS OF INHALATION THERAPY, STUDENTS AND GRADUATES: 1963-64 THROUGH 1968-69

Academic year	Programs	Students	Graduates	Academic year	Programs	Students	Graduates
1968-69	55	385	145	1965-66	21	102	102
1967-68	44	323	200	1964-65	11	48	48
1966-67	30	178	150	1963-64	7	49	----

Source: Council on Medical Education: Education Number of the *J.A.M.A.* Chicago. American Medical Association. Annual issues.

Table 167. LOCATION OF SCHOOLS OFFERING ACCREDITED INHALATION THERAPY PROGRAMS AND NUMBER OF STUDENTS AND GRADUATES: 1968

Location	School	Ownership	Students (1968–69)	Graduates (1968)
	Total, 41 schools [1]		385	[1] 179
California	Stanford University Hospital-Foothill College, Stanford	Private	29	9
	UCLA Center for the Health Sciences, Los Angeles	Public	7	9
Colorado	General Rose Memorial Hospital-Denver Community College, Denver.	Private	20	3
Connecticut	Hospital of St. Raphael, New Haven	do	11	6
	New Britain General Hospital, New Haven	do	11	7
	Yale-New Haven Community Hospital, New Haven	Public	8	11
Florida	Orange Memorial Hospital, Orlando	Private	14	—
Georgia	Crawford W. Long Memorial Hospital, Atlanta	Public	6	7
Illinois	Cook County Hospital, Chicago	do	11	—
	Edgewater Hospital, Chicago	Private	15	12
	Gottlieb Memorial Hospital, Melrose Park	do	15	—
	Lutheran Hospital, Moline	do	4	3
	Memorial Hospital, Springfield	Public	6	—
	Presbyterian St. Luke's Hospital, Chicago	Private	6	—
	St. John's Hospital, Springfield	do	4	3
	University of Chicago, Chicago	Public	5	8
Indiana	University of Indiana, Indianapolis	do	4	1
Kansas	St. Francis Hospital, Wichita	Private	5	7
	Wesley Medical Center, Wichita	do	5	4
Kentucky	University of Kentucky Medical Center, Lexington	Public	10	4
Massachusetts	New England Medical Center Hospital, Boston	Private	3	—
	Northeastern University, University College with the Harvard Teaching Hospitals, Boston.	do	17	—
Michigan	University Hospital-Washtenaw Community College, Ann Arbor.	Public	33	—
Missouri	Menorah Medical Center, Kansas City	Private	12	5
	St. Mary's Hospital, St. Louis	do	3	—
	University of Missouri Medical Center, Columbia	Public	7	—
New York	Aurelia Osborn Fox Memorial Hospital, Oneonta	Private	7	4
	Niagara Falls Memorial Hospital, Niagara Falls	do	13	12
	Upstate Medical Center State University of N.Y., Syracuse.	Public	12	—
North Carolina	Duke University Medical Center, Durham	Private	5	2
	North Carolina Baptist Hospital, Winston-Salem	do	10	8
Pennsylvania	Robert Packer Hospital, Sayre	do	—	—
	St. Joseph Hospital, Lancaster	do	9	8
	University of Pittsburgh Health Center-Community College of Allegheny, Pittsburgh.	Public	17	9
South Carolina	Medical College of South Carolina, Charleston	do	6	5
South Dakota	Memorial Hospital, Watertown	do	2	4
Tennessee	Baroness Erlanger Hospital, Chattanooga	do	6	4
	City of Memphis Hospital, Memphis	do	—	—
Washington	Deaconess Hospital, Spokane	Private	8	18
	University of Washington Hospital-Highline College, Seattle.	Public	12	—
Wisconsin	Mount Sinai Hospital, Milwaukee	Private	7	6

[1] Information not available from 14 programs with an estimated 21 graduates.

Source: American Medical Association, Division of Medical Education. Department of Allied Medical Professions and Services.

Table 168 LOCATION AND OWNERSHIP OF INSTITUTIONS OFFERING TRAINING PROGRAMS IN ELECTROENCEPHALOGRAPHY: SPRING 1969

Location	Institution [1]	Ownership
Ala.	University of Alabama, Birmingham	Public.
Fla.	University of Florida, Gainesville	do.
Ga.	Emory University, Atlanta	Private.
Ky.	University of Kentucky, Lexington	Public.
Iowa	University of Iowa, Iowa City	do.
La.	Louisiana State University Medical School, New Orleans	do.
Md.	Johns Hopkins Hospital, Baltimore	Private.
Mass.	Massachusetts General Hospital, Boston	do.
	Children's Hospital Medical Center, Boston	do.
Minn.	Mayo Clinic, Rochester	do.
N.C.	Duke University, Durham	do.
Ohio	Cleveland Clinic, Cleveland	do.
Va.	Medical College of Virginia, Richmond	do.
Wash.	University of Washington, Seattle	Public.
Wis.	University of Wisconsin, Madison	do.

[1] This list of 15 institutions is incompiete. Data are not available on student enrollment.

Source: American Society of Electroencephalographic Technologists.

PART II

Inpatient Health Facilities

INTRODUCTION

In 1968, there were an estimated 31,000 inpatient health facilities in the United States. Of these, 19,500, or 63 percent, were in the nursing care and related home category; hospitals accounted for an additional 26 percent; and sheltered care facilities for the remaining 11 percent. This represents an estimated increase of 3,800 inpatient health facilities or 14 percent since 1963. During this period, however, the population increased by only 6 percent. The increase in facilities was mainly due to the large increase in nursing and personal care homes, since only slight increases, if any, were indicated for other types of health facilities (tables 169 and 170).

There were an estimated 2.7 million beds in inpatient health facilities in 1968. This included 934,300 beds in general medical and surgical hospitals and 630,000 beds in specialty hospitals, 880,000 beds in nursing care and related homes, and 224,000 beds in other inpatient health facilities.

In the United States there was an increase in the bed-to-population ratio for all facilities, from 12.4 beds per 1,000 persons in the U.S. population in 1963, to 13.5 beds per 1,000 persons in 1968. This occurred despite the fact that the bed-to-population ratio for tuberculosis and psychiatric hospitals combined decreased from 3.6 to 2.7 beds per 1,000 persons during the same period. The latter decrease in the bed-to-population ratio resulted from the elimination or conversion to other uses of State mental hospital and tuberculosis beds. For tuberculosis hospitals this represents a decrease in the number of admissions, and for psychiatric hospitals, a reduction in the length of stay and the transfer of older patients to other long-stay facilities.

The Master Facility Inventory (MFI)

The Division of Health Resources Statistics of the National Center for Health Statistics conducts a national statistical program of data collection on all inpatient health facilities in the United States including hospitals, nursing homes, and other health and correctional facilities. This data system (the Master Facility Inventory or MFI) consists of (a) the Master Facility list (MFL) which is a computer tape containing the names and addresses of all known inpatient health facilities in the United States, (b) the Master Facility Census (MFC) which is a system of planned censuses of inpatient health facilities taken biannually or more frequently to determine the type of business, the number of employees, and the number of residents or patients in these facilities at the time of the census, and (c) the Agency Reporting System (ARS) which is a program for determining on an annual or more frequent basis the names and addresses of all newly established inpatient facilities. The ARS consists of national voluntary organizations and Federal and State agencies, including health, welfare, and voluntary religious organizations; publishers of commercial directories; State agencies which administer, regulate, license, certify, approve, list, or are otherwise concerned with medical and resident care facilities; and Federal agencies that administer inpatient facilities. The ARS provides accessions to the system which are matched with the MFL and any nonmatches are then added to the MFL. Listed facilities which are nonexistent due to termination of business or for other reasons are eliminated from the MFL by biennial or more frequent surveys. The 1967 MFL was derived from a list of facilities in the 1963 MFC plus lists supplied by the ARS.

Presently, the NCHS has computer tapes available of lists of inpatient health facilities in the United States, including hospitals, nursing care and related homes and other inpatient health facilities. Further details about this program may be obtained from the Chief, Health Facilities Statistics Branch, National Center for Health Statistics, Washington, D.C. 20201.

MFI CLASSIFICATION OF HEALTH FACILITIES

In the MFI, the following definitions of facilities have been used.

Hospital

A hospital is defined as a facility which is licensed by the State as a hospital, or operated as a hospital by a Federal or State agency and therefore not subject to State or local licensing laws.

Facilities Providing Nursing Care

Places providing some form of nursing, personal, or domiciliary care were classified according to the primary or predominant service provided as follows:

1. A *nursing care home* is defined as one in which 50 percent or more of the residents receive one or more nursing services and the facility has at least one registered nurse (RN) or licensed practical nurse (LPN) employed 35 or more hours per week. Nursing services include nasal feeding, catheterization, irrigation, oxygen therapy, full bed bath, enema, hypodermic injection, intravenous injection, temperature-pulse-respiration, blood pressure, application of dressing or bandage, or bowel and bladder retraining.
2. A *personal care with nursing home* is defined as one in which either (a) some, but less than 50 percent, of the residents receive nursing care or (b) more than 50 percent of the residents receive nursing care, but no RN's or LPN's were employed full time on the staff.
3. A *personal care home* is defined as one in which the facility routinely provides three or more personal services, but no nursing service. Personal services include rub or massage service or assistance with bathing, dressing, correspondence or shopping, walking or getting about, or eating.
4. A *domiciliary care home* is defined as one in which the facility routinely provides less than three of the personal services specified in the definition above, and no nursing service. This type of facility provides a sheltered environment primarily to persons who are able to care for themselves.

If room and board are the only services provided by an establishment, it is excluded as a health facility.

Other Inpatient Health Facilities

An "other inpatient health facility" is defined as a facility which provides services such as training and sheltered care, rather than medical or nursing care. Problems of distinguishing among various types of treatment facilities for the mentally retarded led to grouping all facilities for the mentally retarded under the category "other inpatient health facility."

The facilities listed below constitute those classified by the MFI, as "other inpatient health facilities."

(1) Home for the blind and deaf.
(2) Home for unwed mothers.
(3) Orphanage.
(4) Home for dependent children.
(5) Home or school for the physically handicapped.
(6) Facility for the mentally retarded.
(7) Home for the emotionally disturbed.
(8) Other resident facilities.

Other Sources of Data

The American Hospital Association (AHA) annually publishes information on hospitals in the United States and outlying areas and lists hospitals and all health care facilities accredited by the Joint Commission on Accreditation of Hospitals (*60*). A variety of information is published concerning each individual hospital, including facilities and services available within the hospital, the type of ownership, financial data and other statistical data.

The National Institute of Mental Health conducts annual surveys of all inpatient and outpatient psychiatric facilities in the United States. The findings on numbers of facilities, admissions, terminations, resident patients and expenditure data, are published annually in a series of statistical reports (*61*).

In 1967, the Social Security Administration (SSA) conducted a survey of institutionalized adults. This survey obtained information on patient charges, the type of care received, and on the social and economic characteristics of patients or residents in hospitals, rehabilitation and other training schools, and in other long-stay facilities.

Additional data were collected in 1968 from the responsible relative or guardian of the institutionalized person by the Bureau of the Census. Preliminary data are expected to be available in 1970.

The 1960 Census of Population provides summary statistics on the number of institutions by type and size. In addition, statistics were published on the characteristics of persons under care or custody in institutions in the United States. The statistics are based on a 25 percent sample of the population (*62*).

In early 1968 the National Center for Health Statistics conducted a nationwide survey of all resident facilities providing nursing and personal services. This survey will provide information on admission policies, services, and staff of these facilities as well as the kinds of such facilities in the United States. Information will be available in 1970.

The Health Facilities Planning and Construction Service of the U.S. Public Health Service under provision of the Hill-Burton Hospital Survey and Construction Act publishes U.S. summary statistics annually on civilian health facilities showing both supply and requirements. These statistics are developed by the various State Agencies responsible for administering the program. "Each State Plan includes an inventory of all non-Federal inpatient and outpatient facilities exclusive of mental hospitals, institutions furnishing domiciliary care, and institutions not providing a community service" (*63*). Inpatient facilities are reported in the State Plans according to the following major categories of services provided: general, long-term care (chronic disease and skilled nursing home beds), and tuberculosis. Facilities for outpatient care include public health centers, diagnostic or treatment centers, and rehabilitation facilities (*63*). Excluded are such outpatient facilities as physicians offices, certain clinics, ambulance services, and pharmacies.

The Social Security Administration under the health insurance program for the aged publishes directories of providers of service (*64–67*). Names and addresses of these providers of service which are certified by the SSA, such as hospitals, extended care facilities, home health agencies, and independent laboratories are listed.

The Veterans' Administration (VA) medical program provides hospital, outpatient, nursing, and domiciliary care to eligible veterans. In connection with this program, the VA publishes annually information on their medical system (*68*).

License

In those instances where inpatient health facilities are regulated, there were more than 100 State agencies which licensed, approved, certified, supervised or otherwise regulated them. These regulatory responsibilities assume different forms in various States and differ in number by State.

Licensing is the most common form of regulation. A license to operate within a State, issued by a State agency, is a means of identifying hospitals, nursing care and related homes, and other inpatient health facilities. Licensing statistics secured from State licensure agencies over a period of time may be used to determine shifts in the patterns of growth for the various types of facilities licensed.

Health and welfare departments accounted for three-quarters of all agencies providing regulatory functions. In most States the health department regulates hospitals and nursing homes and the welfare department is responsible for the regulation of homes for dependent and neglected children and for homes for unwed mothers. A number of States, however, depart from the general pattern.

In order to summarize rules and regulations affecting medical and residential care facilities in the United States, the National Center for Health Statistics, is sponsoring a survey of those State agencies which license, certify, inspect, or otherwise regulate health facilities. These facilities will include all hospitals and those establishments which provide custodial, nursing, or personal care to residents or inmates. Preliminary findings are expected to be available in the spring of 1970.

Certification

In 1965 Congress added to the Social Security program two amendments on health care and services. One Title XVIII, established MEDICARE—a Federal program of hospital and medical insurance for nearly all people 65 and over. The other, Title XIX, established MEDICAID —a Federal-State program to help provide medical services for the needy and the medically indigent. Hospital and extended care facilities participating in the health insurance program for the aged (Title XVIII) under the Social Security Act must

be certified by designated State agencies to the effect that the facility is in general compliance with the conditions for participation. These requirements may take the form of round-the-clock skilled nursing care, medical supervision of each patient, clinical records on all patients, and transfer arrangements between facilities. Hospitals and other providers of service may be temporarily certified for participation under the program if they are found to be in substantial compliance with the conditions for participation, despite the fact that correctable deficiencies may be found with respect to one or more standards (*69*). Plans and actions for correcting these deficiencies must be undertaken within a stipulated time period.

As is the case with facilities under title XVIII, institutions under title XIX must be similarly certified. Three types of facilities that are certified providers under title XVIII are considered, ipso facto, certified under title XIX. These facilities are hospitals, home health agencies, and independent laboratories. With slight variations in the regulations, nursing homes certified as extended care facilities under title XVIII qualify as skilled nursing homes under title XIX. The slight additions relating to skilled nursing homes are the filing of an ownership statement and a revised transfer agreement with a hospital (*70*).

Under the law, only those hospitals which have not been accredited by the Joint Commission on Accreditation of Hospitals (JCAH) or the American Osteopathic Association (AOA) but are participating in the Medicare program must be resurveyed periodically. Only hospitals in an accredited status are excluded from the resurvey requirements. However, all hospitals regardless of accreditation, have to be surveyed for the utilization review requirements, and in addition psychiatric and tuberculosis hospitals have other special requirements.

Registration

The American Hospital Association (AHA) maintains a system of registration in order to identify health care institutions in the United States. The primary aim of the Association's program of accepting hospitals for registration is to maintain a roster of high quality hospitals in the United States. A hospital which has at least six beds for the care of patients and which meets certain other requirements as to its construction, medical staff, and services is eligible for registration under this program. Membership in the American Hospital Association is not a prerequisite for registration. A listing of these registered hospitals is published annually in the *Guide Issue* of the Journal of the American Hospital Association. The list is coded to indicate AHA members.

Accreditation

Voluntary accreditation programs by establishing standards for the operation of hospitals and other health care facilities and services have been an effective force in promoting and upgrading health care in this country. Participation in these programs has been voluntary on the part of the facilities involved. There are two accreditation boards that were organized for the purpose of accrediting health care facilities—the Joint Commission on Accreditation of Hospitals and the American Osteopathic Association (AOA).

The Joint Commission on Accreditation of Hospitals was formed 17 years ago by the cooperative efforts of the American College of Surgeons (which had performed accreditation surveys of hospitals for the preceding 30 years), the American College of Physicians, the American Hospital Association, the American Medical Association and the Canadian Medical Association. The Canadian Medical Association withdrew in 1959 in order to set up its own Canadian Council on Accreditation of Hospitals fashioned after the JCAH.

In 1966, the JCAH undertook the additional responsibility for the accreditation of extended, nursing, and resident care facilities. "Two additional groups, the American Association of Homes for the Aging and the American Nursing Home Association were added as participating organizations with representation on the Board of Commissioners" (*71*). Registration with the American Hospital Association is a prerequisite for an accreditation survey by the JCAH.

Another program of the JCAH is to carry out the administrative and field program of the Commission on Accreditation of Rehabilitation Facilities (CARF). For nearly 10 years the Association of Rehabilitation Centers and the National Association of Sheltered Workshops and Homebound Programs have independently been working together to develop standards for quality, each for its own category of institution. In 1966 the two joined efforts to create the Commission on Accreditation of Rehabilitation Facilities.

In addition, starting in early 1970, the JCAH will initiate a program to accredit mental retardation facilities.

The American Osteopathic Association is the accrediting body for osteopathic hospitals and osteopathic extended health care facilities. A listing of all osteopathic institutions accredited by the AOA appears annually in the Registry of Accredited Osteopathic Institutions (*72*).

Association Membership

Health facilities may belong to a variety of State, regional, or national professional organizations. These organizations range from general to specialized associations and may be large or small in number.

The American Hospital Association membership includes over 6,600 hospitals and other patient care institutions in the United States. The Association offers several types of membership depending upon the types of organizations involved. In order to be a member, a facility must be registered by the Association.

The American Nursing Home Association represents more than 7,200 nursing and convalescent homes which have an aggregate of more than 400,000 nursing home beds. Several types of group or individual memberships are offered by the Association depending upon the type of personnel or organization applying.

The American Association of Homes for the Aging is the national membership organization of nonprofit, voluntary, and governmental homes for the aging across the country. Approximately 900 institutions are members of the Association. In addition, the Association has other types of memberships depending upon the type of organization.

The American Osteopathic Hospital Association is the national organization which represents osteopathic hospitals in this country. Almost three-quarters of the approximately 300 osteopathic hospitals belong to the Association.

In addition, there are a number of smaller organizations to which health facilities belong.

Reliability of Data

Estimates of the completeness of coverage for the 1967 MFC are not available, but there is supporting evidence to indicate that coverage was high and represented a considerable improvement over the 1963 MFC, since the 1967 MFC included the earlier MFC as one of its sources. Comparison of the 1963 MFC with surveys conducted by the Bureau of the Census for NCHS, indicated that coverage of facilities for the 1963 MFC was about 90 percent complete. The most complete coverage was for hospitals. For nursing and personal-care-type homes coverage was about 90 percent complete, and for other types of institutions the coverage was estimated to be about 80 percent complete.

Data for 1963 and 1967 were obtained from the Master Facility Census. Data for 1968 was from the annual survey of hospitals sponsored jointly by the American Hospital Association and the NCHS.

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Table 169. INPATIENT HEALTH FACILITIES: SELECTED YEARS 1963 THROUGH 1968

Type of facility	1963	1967	1968
Total facilities	27,171	30,586	30,991
Hospitals	8,183	8,147	7,991
General medical and surgical hospitals	6,710	6,685	6,539
Specialty hospitals	1,473	1,462	1,452
Psychiatric	581	573	494
Geriatric and chronic	221	333	291
Tuberculosis	258	169	129
Other [1]	423	387	538
Nursing care and related homes	16,701	19,141	[2] 19,500
Nursing care	8,128	10,636	----
Personal care with nursing care	4,958	3,853	----
Personal care without nursing care	2,927	4,396	----
Domiciliary care	688	256	----
Other inpatient health facilities	2,287	3,298	[2] 3,500
Mental retardation	----	1,486	----
Other	----	1,812	----

[1] Includes eye, ear, nose and throat hospitals; epileptic hospitals; alcoholic hospitals; narcotic hospitals; maternity hospitals; orthopedic hospitals; physical rehabilitation hospitals; and other hospitals.
[2] Estimated.

Table 170. BEDS IN INPATIENT HEALTH FACILITIES: SELECTED YEARS 1963 THROUGH 1968

Type of facility	Number			Number per 1,000 population		
	1963	1967	1968	1963	1967	1968
Total beds	2,317,425	2,688,876	2,668,441	12.4	13.7	13.5
Hospitals	1,549,952	1,631,101	1,564,444	8.3	8.3	7.9
General medical and surgical hospitals	811,876	958,729	934,297	4.3	4.9	4.7
Specialty hospitals	738,076	672,372	630,147	4.0	3.4	3.2
Psychiatric	614,104	545,913	503,042	3.3	2.8	2.6
Geriatric and chronic	38,213	61,211	43,921	0.2	0.2	0.2
Tuberculosis	50,074	33,335	25,381	0.3	0.2	0.1
Other [1]	35,685	31,913	57,803	0.2	0.2	0.3
Nursing care and related homes	568,560	836,554	[2] 880,000	3.0	4.3	4.5
Nursing care	319,224	584,052	----	1.7	3.0	----
Personal care with nursing care	188,306	181,096	----	1.0	1.0	----
Personal care without nursing care	48,962	66,787	----	0.3	0.3	----
Domiciliary care	12,068	4,619	----	0.1	0.0	----
Other inpatient health facilities	198,913	221,221	[2] 224,000	1.1	1.1	1.1
Mental retardation	----	212,069	----	----	1.1	----
Other	----	9,152	----	----	0.0	----

[1] Includes eye, ear, nose and throat hospitals; epileptic hospitals; alcoholic hospitals; narcotic hospitals; maternity hospitals; orthopedic hospitals; physical rehabilitation hospitals; and other hospitals.

[2] Estimated.

Source: U.S. Bureau of the Census: Population Estimates. *Current Population Reports.* Series P-25, No. 422, May 1969.

CHAPTER 36

Hospitals

The first hospitals in the United States were established over 200 years ago. "There is no record of hospitals in the early days of the American colonies. The first efforts for the care of the sick were incidental to shelter for the poor and unfortunate through almshouses. The first of these was founded in Philadelphia by William Penn in 1713, followed soon by others in New York City and Charleston, S.C. The famous Charity Hospital in New Orleans, dating from 1737, was originally both a hospital and an asylum for the indigent. The first bona fide hospital in the United States solely for the physically and mentally ill, without regard to economic status or race or creed, was established in 1751 and was known as the Pennsylvania Hospital. Other early hospitals grew out of a need to provide a place for clinical practice for medical schools, in New York, Massachusetts, and Connecticut. These early hospitals were chiefly of voluntary sponsorship, outside of public or church sponsorship." (*73*) Federal Government participation in health care was initiated with the establishment of the Public Health Service hospital program for merchant seamen in 1798. State government participation in health care, however, was mainly confined to the mental health field with construction of large State institutions between 1825 and 1850.

The first count of hospitals was compiled by the U.S. Bureau of Education in 1873; only 178 hospitals were listed (*74*). In 1909, the Bureau of the Census survey of hospitals showed 4,359 hospitals of all types, with a total of 421,000 beds. Subsequent censuses indicated that the number of hospitals increased to 5,047 in 1914, with 532,400 beds, and to 6,852 in 1928, with 893,000 beds. By 1938 the number of hospitals had decreased to 6,166 hospitals, but the number of beds increased to 1,161,380 beds (*75*). In 1963, the number again increased to almost 8,200 hospitals with 1.5 million beds. By 1968, the number of hospitals declined to approximately 8,000 with the number of beds slightly above the 1963 level.

Although each State requires that hospitals be licensed in order to operate, the requirements and standards for licensure vary considerably from State to State. State agencies—in most States, the health department—have the responsibility for the licensing of these facilities.

Unlike licensure, accreditation standards do not vary by State, and the accreditation program is purely voluntary on the part of the hospital. Hospital accreditation by the Joint Commission on Accreditation of Hospitals (JCAH) may be granted for 3 years or for 1 year, or it may be withheld, if the hospital does not meet specific standards. At the end of the accreditation period (either 3 years or 1 year) the hospital is automatically surveyed to reevaluate its accreditation status. A hospital that has been refused accreditation may apply for another survey to determine its accreditation status, usually after 6 months have elapsed from the initial survey (*76*). In 1968, 69 percent of all hospitals in the United States were accredited (*77*). The remaining 31 percent either failed to apply or were rejected for accreditation.

According to the MFC, hospitals have been divided into two types—general or short-term hospitals and specialty or long-term care facilities. In 1968, of the total 7,991 hospitals of all types, the general medical and surgical hospitals constituted, by far, the largest number: 6,539 or 81.8 percent (table 172).

General Hospitals

General medical and surgical hospitals are establishments which provide diagnostic and treatment services for patients who have a variety of medical conditions both surgical and nonsurgical. The majority of these in 1968 were considered by the MFC as short-term care hospitals. A few, about 5 percent fell into the long-term class.

There were approximately 6,500 general hospitals in the United States in 1968, a 2.6 percent decrease in the number of facilities since 1963

(table 169). General hospitals ranged widely in size. Approximately one third had a capacity of less than 50 beds, and approximately 13 percent had a capacity of more than 300 beds (table 171). In 1968, there were 934,297 beds in general hospitals, or approximately one general hospital bed for every 4.7 persons in the United States population. On a State basis, the number of beds per 1,000 persons in the United States population varied from 9.3 in the District of Columbia to a low of 3.8 in Delaware (tables 173 and 174).

Nearly 54 percent of all general hospitals were nonprofit. Federal, State, and local government owned 32 percent. The other 14 percent were proprietary (table 175).

For general hospitals in 1968, there was a daily average of almost 731,000 patients, and there were more than 28.6 million admissions for a ratio of 144.7 admissions per 1,000 population. Discharges from these hospitals reached 28.3 million in 1968 (table 176).

In 1968, almost 2.1 million persons were employed either full or part-time in general hospitals. Eighty percent of these were employed full-time. Nationally, there was an average of 2.3 full-time employees for each patient (table 177).

Specialt. Hospitals

Specialty hospitals are establishments which usually limit their admissions to specific groups of patients. In 1968, most specialty hospitals were considered by the MFC as long-term care hospitals. This group consisted largely of psychiatric, geriatric and chronic, and tuberculosis hospitals.

In 1968, there were almost 1,500 specialty hospitals in the United States. The largest group were psychiatric hospitals. Fourteen percent of all specialty hospitals had a capacity of 1,000 beds or more, however almost all of these were psychiatric hospitals (tables 171 and 172). There were 630,147 beds in specialty hospitals in 1968. Psychiatric beds comprised 80 percent of all specialty hospital beds; geriatric and chronic disease beds, an additional 7 percent; and beds devoted to tuberculosis and other services comprised the other 13 percent. Nationally, there was one specialty hospital bed for every 3 persons in the United States population. There was a wide variation in the utilization rate among the States. Rates range from a high of 10.3 beds per 1,000 population in the District of Columbia, to a low of 0.7 beds per 1,000 in New Hampshire. A number of States did not indicate any available long-term geriatric or tuberculosis beds (tables 173 and 174).

Specialty hospitals were largely (46 percent) under Federal, State, and local government ownership. Only 24 percent were privately owned and managed (table 175).

These hospitals admitted and discharged approximately 1.4 million persons in 1968. During 1968, specialty hospitals had a daily average of almost 520,000 persons, for a ratio of 2.6 average daily residents per 1,000 population (table 178).

Over 431,800 persons were employed in specialty hospitals, of whom 393,400 were full-time personnel. Overall, there was an average of something less than 1 full-time employee per patient. Ten States had more than one full-time employee per patient (table 179).

Hospitals for the Mentally Retarded

Data on hospitals for the mentally retarded have been combined with data on homes or resident schools for the mentally retarded (See ch. 38).

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(74) Commission on Hospital Care: *Hospital Care in the United States.* New York. The Commonwealth Fund, 1947.

(75) Bureau of the Census: *Historical Statistics of the United States, Colonial Times to 1957.* Washington. U.S. Government Printing Office, 1960.

(76) American Hospital Association: *Hospital Accreditation References.* Chicago. American Hospital Association, 1965.

(77) American Hospital Association: Hospitals Guide Issue, Part 2. *J.A.H.A.* Chicago, August 1969.

Table 171. BED SIZE OF HOSPITALS: 1968

Bed size	Total hospitals	General medical and surgical	Specialty				
			Total	Psychiatric	Geriatric and chronic	Tuberculosis	Other [1]
Total	7,991	6,539	1,452	494	291	129	538
Under 25 beds	803	633	170	31	20	2	117
25–49	1,826	1,597	229	42	49	15	123
50–74	1,085	908	177	41	41	14	81
75–99	801	652	149	34	46	19	50
100–199	1,546	1,282	264	59	68	32	105
200–299	704	608	96	27	28	15	26
300–499	653	571	82	27	15	20	20
500–999	318	236	82	45	17	11	9
1,000 beds or more	255	52	203	188	7	1	7

[1] Includes eye, ear, nose and throat hospitals; epileptic hospitals; alcoholic hospitals; narcotic hospitals; maternity hospitals; orthopedic hospitals; physical rehabilitation hospitals; and other hospitals.

Table 172. HOSPITALS BY STATE: 1968

State	Total hospitals	General medical and surgical	Specialty				
			Total	Psychiatric	Geriatric and chronic	Tuberculosis	Other [1]
United States	7,991	6,539	1,452	494	291	129	538
Alabama	149	131	18	5	—	7	6
Alaska	26	23	3	1	2	—	—
Arizona	85	78	7	4	—	1	2
Arkansas	109	98	11	2	3	2	4
California	742	563	179	48	75	3	53
Colorado	108	85	23	8	3	1	11
Connecticut	70	46	24	12	6	—	6
Delaware	14	10	4	1	2	—	1
District of Columbia	21	14	7	3	1	—	3
Florida	208	178	30	11	—	2	17
Georgia	186	165	21	7	—	1	13
Hawaii	34	25	9	1	2	1	5
Idaho	51	47	4	2	—	1	1
Illinois	320	256	64	22	6	17	19
Indiana	144	115	29	13	2	5	9
Iowa	158	142	16	7	2	2	5
Kansas	165	155	10	7	1	1	1
Kentucky	144	120	24	7	1	8	8
Louisiana	159	146	13	4	2	1	6
Maine	69	62	7	2	3	1	1
Maryland	87	56	31	17	5	2	7
Massachusetts	254	167	87	22	26	3	36
Michigan	323	236	87	20	36	5	26
Minnesota	204	187	17	9	—	3	5
Mississippi	133	120	13	3	2	1	7
Missouri	182	155	27	11	4	—	12
Montana	68	61	7	—	3	1	3
Nebraska	127	114	13	4	5	—	4
Nevada	23	21	2	1	—	—	1
New Hampshire	41	31	10	2	4	1	3
New Jersey	163	128	35	14	7	2	12
New Mexico	67	59	8	2	—	1	5
New York	478	374	104	44	17	4	39
North Carolina	172	142	30	7	2	4	17
North Dakota	66	62	4	1	1	1	1
Ohio	288	218	70	26	14	11	19
Oklahoma	159	142	17	3	2	2	10
Oregon	101	84	17	4	6	—	7
Pennsylvania	380	280	100	39	16	5	40
Rhode Island	25	19	6	3	—	—	3
South Carolina	99	84	15	3	3	3	6
South Dakota	73	68	5	2	—	1	2
Tennessee	194	165	29	7	3	3	16
Texas	623	550	73	19	8	4	42
Utah	51	44	7	1	2	2	2
Vermont	24	19	5	2	—	1	2
Virginia	134	102	32	11	3	2	16
Washington	135	118	17	8	—	2	7
West Virginia	97	81	16	6	3	1	6
Wisconsin	226	165	61	34	7	10	10
Wyoming	32	28	4	2	1	—	1

[1] Includes eye, ear, nose and throat hospitals; epileptic hospitals; alcoholic hospitals; narcotic hospitals; maternity hospitals; orthopedic hospitals; physical rehabilitation hospitals; and other hospitals.

Table 173. HOSPITAL BEDS BY STATE: 1968

State	Total beds	General medical and surgical	Specialty				
			Total	Psychiatric	Geriatric and chronic disease	Tuberculosis	Other [1]
United States	1,564,444	934,297	630,147	503,042	43,921	25,381	57,803
Alabama	26,311	14,142	12,169	10,665	—	1,125	379
Alaska	2,112	1,575	537	225	312	—	—
Arizona	9,899	8,406	1,493	1,229	—	160	104
Arkansas	12,220	9,804	2,416	801	378	599	638
California	126,679	84,115	42,564	29,742	6,164	393	6,265
Colorado	17,837	12,513	5,324	3,702	120	52	1,450
Connecticut	21,214	11,479	9,735	7,693	1,251	—	791
Delaware	4,348	1,986	2,362	1,262	928	—	172
District of Columbia	15,391	7,284	8,107	6,331	844	—	932
Florida	41,162	28,555	12,607	10,910	—	1,002	695
Georgia	32,430	19,248	13,182	11,962	—	491	729
Hawaii	5,296	3,219	2,077	687	294	394	702
Idaho	3,908	2,880	1,028	722	—	44	262
Illinois	88,381	56,176	32,205	27,589	487	2,542	1,587
Indiana	34,934	20,512	14,422	12,354	189	612	1,267
Iowa	20,029	15,753	4,276	3,554	105	467	150
Kansas	17,756	13,230	4,526	4,254	—	80	192
Kentucky	21,844	13,409	8,435	5,811	150	1,005	1,469
Louisiana	23,779	16,444	7,335	6,189	119	351	676
Maine	9,100	5,878	3,222	3,000	134	88	—
Maryland	31,363	15,056	16,307	11,581	1,599	565	2,562
Massachusetts	57,765	25,359	32,406	21,144	6,034	337	4,891
Michigan	68,364	38,320	29,544	20,197	3,940	1,698	3,709
Minnesota	28,924	21,468	7,456	5,924	—	248	1,284
Mississippi	16,891	10,048	6,843	6,239	67	420	117
Missouri	37,863	23,413	14,450	10,025	1,308	—	3,117
Montana	4,701	4,184	517	—	315	170	32
Nebraska	13,232	9,167	4,065	2,743	444	—	878
Nevada	2,809	2,222	587	564	—	—	23
New Hampshire	3,697	3,186	511	111	236	82	82
New Jersey	51,873	27,450	24,423	20,796	1,466	500	1,661
New Mexico	6,241	4,825	1,416	832	—	108	476
New York	190,565	85,811	104,754	91,402	8,272	700	4,380
North Carolina	33,336	20,343	12,993	10,828	133	1,221	811
North Dakota	6,277	4,362	1,915	1,505	60	234	116
Ohio	74,254	44,329	29,925	25,563	954	1,640	1,768
Oklahoma	16,369	12,091	4,278	3,346	73	520	339
Oregon	12,672	8,615	4,057	3,505	342	—	210
Pennsylvania	111,397	63,040	48,357	39,354	3,547	1,145	4,311
Rhode Island	8,886	6,405	2,481	2,144	—	—	337
South Carolina	19,361	11,525	7,836	6,667	283	686	200
South Dakota	6,737	4,550	2,187	2,006	—	110	71
Tennessee	29,546	17,902	11,644	9,476	530	485	1,153
Texas	74,463	50,540	23,923	17,957	498	801	4,672
Utah	7,119	4,231	2,888	641	142	1,920	185
Vermont	3,743	2,072	1,671	1,613	—	50	8
Virginia	34,910	18,780	16,130	14,873	65	577	615
Washington	18,708	13,149	5,559	4,595	—	425	539
West Virginia	15,781	9,951	5,830	4,846	324	604	56
Wisconsin	38,616	22,777	15,839	12,622	1,771	730	716
Wyoming	3,351	2,018	1,333	1,261	48	—	24

[1] Includes eye, ear, nose and throat hospitals; epileptic hospitals; alcoholic hospitals; narcotic hospitals; maternity hospitals; orthopedic hospitals; physical rehabilitation hospitals; and other hospitals.

Table 174. HOSPITAL BEDS PER 1,000 POPULATION BY STATE: 1968

State	Total beds	General medical and surgical	Specialty				
			Total	Psychiatric	Geriatric and chronic disease	Tuberculosis	Other [1]
United States	7.9	4.7	3.2	2.5	0.2	0.1	0.3
Alabama	7.5	4.1	3.5	3.1	—	0.3	0.1
Alaska	8.7	6.5	2.2	0.9	1.3	—	—
Arizona	6.1	5.1	0.9	0.8	—	0.1	0.1
Arkansas	6.2	5.0	1.2	0.4	0.2	0.3	0.3
California	6.7	4.5	2.3	1.6	0.3	0.0	0.3
Colorado	8.9	6.2	2.7	1.8	0.1	0.0	0.7
Connecticut	7.2	3.9	3.3	2.6	0.4	—	0.3
Delaware	8.3	3.8	4.5	2.4	1.8	—	0.3
District of Columbia	19.6	9.3	10.3	8.1	1.1	—	1.2
Florida	6.7	4.7	2.1	1.8	—	0.2	0.1
Georgia	7.3	4.3	3.0	2.7	—	0.1	0.2
Hawaii	7.4	4.5	2.9	1.0	0.4	0.5	1.0
Idaho	5.5	4.1	1.5	1.0	—	0.1	0.4
Illinois	8.1	5.2	3.0	2.5	0.0	0.2	0.1
Indiana	6.9	4.1	2.9	2.4	0.0	0.1	0.3
Iowa	7.2	5.7	1.5	1.3	0.0	0.2	0.1
Kansas	7.9	5.9	2.0	1.9	—	0.0	0.1
Kentucky	6.9	4.2	2.7	1.8	0.0	0.3	0.5
Louisiana	6.5	4.5	2.0	1.7	0.0	0.1	0.2
Maine	9.4	6.1	3.3	3.1	0.1	0.1	—
Maryland	8.6	4.1	4.5	3.2	0.4	0.2	0.7
Massachusetts	10.7	4.7	6.0	3.9	1.1	0.1	0.9
Michigan	7.9	4.5	3.4	2.3	0.5	0.2	0.4
Minnesota	7.9	5.9	2.0	1.6	—	0.1	0.4
Mississippi	7.3	4.3	2.9	2.7	0.0	0.2	0.1
Missouri	8.3	5.1	3.2	2.2	0.3	—	0.7
Montana	6.8	6.1	0.8	—	0.5	0.2	0.0
Nebraska	9.2	6.4	2.8	1.9	0.3	—	0.6
Nevada	6.4	5.1	1.3	1.3	—	—	0.1
New Hampshire	5.3	4.6	0.7	0.2	0.3	0.1	0.1
New Jersey	7.4	3.9	3.5	3.0	0.2	0.1	0.2
New Mexico	6.4	4.9	1.4	0.8	—	0.1	0.5
New York	10.5	4.7	5.8	5.0	0.5	0.0	0.2
North Carolina	6.6	4.1	2.6	2.2	0.0	0.2	0.2
North Dakota	10.3	7.1	3.1	2.5	0.1	0.4	0.2
Ohio	7.0	4.2	2.8	2.4	0.1	0.2	0.2
Oklahoma	6.6	4.8	1.7	1.3	0.0	0.2	0.1
Oregon	6.3	4.3	2.0	1.8	0.2	—	0.1
Pennsylvania	9.5	5.4	4.1	3.4	0.3	0.1	0.4
Rhode Island	10.1	7.3	2.8	2.4	—	—	0.4
South Carolina	7.5	4.5	3.0	2.6	0.1	0.3	0.1
South Dakota	10.2	6.9	3.3	3.0	—	0.2	0.1
Tennessee	7.5	4.6	3.0	2.4	0.1	0.1	0.3
Texas	6.9	4.7	2.2	1.7	0.0	0.1	0.4
Utah	6.9	4.1	2.8	0.6	.01	1.9	0.2
Vermont	8.7	4.8	3.9	3.8	—	0.1	0.0
Virginia	7.9	4.2	3.6	3.4	0.0	0.1	0.1
Washington	5.8	4.1	1.7	1.4	—	0.1	0.2
West Virginia	8.7	5.5	3.2	2.7	0.2	0.3	0.0
Wisconsin	9.2	5.4	3.8	3.0	0.4	0.2	0.2
Wyoming	10.5	6.3	4.2	4.0	0.2	—	0.1

[1] Includes eye, ear, nose and throat hospitals; epileptic hospitals; alcoholic hospitals; narcotic hospitals; maternity hospitals; orthopedic hospitals; physical rehabilitation hospitals; and other hospitals.

Source: U.S. Bureau of the Census: Population estimates. *Current Population Reports.* Series P-25, N 430. Aug. 1969.

Table 175. OWNERSHIP OF HOSPITALS: 1968

Ownership	Total hospitals	General medical and surgical	Specialty				
			Total	Psychiatric	Geriatric and chronic	Tuberculosis	Other [1]
Total	7,991	6,539	1,452	494	291	129	538
Government	2,771	2,103	668	312	119	120	117
Federal	440	389	51	37	1	2	11
State-local	2,331	1,714	617	275	118	118	106
Proprietary	1,265	913	352	86	101	1	164
Nonprofit	3,955	3,523	432	96	71	8	257
Church	1,055	958	97	20	24	1	52
Other	2,900	2,565	335	76	47	7	205

[1] Includes eye, ear, nose and throat hospitals; epileptic hospitals; alcoholic hospitals; narcotic hospitals; maternity hospitals; orthopedic hospitals; physical rehabilitation hospitals; and other hospitals.

Table 176. AVERAGE DAILY PATIENTS, ADMISSIONS AND DISCHARGES FOR GENERAL HOSPITALS BY STATE: 1968

State	Number			Number per 1,000 population		
	Average daily patients	Admissions	Discharges	Average daily patients	Admissions	Discharges
United States	730,799	28,581,142	28,312,552	3.7	144.7	143.3
Alabama	11,121	500,268	500,885	3.2	143.5	143.6
Alaska	999	36,956	36,859	4.1	152.7	152.3
Arizona	6,301	268,000	262,779	3.9	163.9	160.7
Arkansas	7,457	292,490	280,032	3.8	148.2	141.9
California	63,080	2,648,184	2,650,661	3.4	140.9	141.0
Colorado	8,894	376,292	386,507	4.4	187.3	192.4
Connecticut	9,343	335,667	361,593	3.2	113.9	122.7
Delaware	1,572	60,328	59,218	3.0	115.1	113.0
District of Columbia	5,885	176,031	173,309	7.5	224.0	220.5
Florida	22,401	923,181	898,043	3.7	151.0	146.9
Georgia	15,374	663,149	662,799	3.4	148.5	148.4
Hawaii	2,402	85,567	85,761	3.3	119.2	119.4
Idaho	1,970	100,830	98,004	2.8	143.0	139.0
Illinois	45,589	1,612,842	1,592,862	4.2	148.0	146.2
Indiana	16,808	699,383	690,742	3.3	138.3	136.6
Iowa	11,803	471,680	438,763	4.3	170.1	158.2
Kansas	9,846	366,451	362,341	4.4	162.3	160.5
Kentucky	10,628	491,703	478,385	3.4	155.3	151.1
Louisiana	11,846	553,732	552,714	3.2	152.5	150.8
Maine	4,405	158,434	151,573	4.6	164.2	157.1
Maryland	11,207	433,666	430,761	3.1	119.0	118.2
Massachusetts	20,009	750,703	740,780	3.7	139.0	137.2
Michigan	31,379	1,252,629	1,239,837	3.6	144.7	143.3
Minnesota	16,265	627,083	614,210	4.4	171.4	167.9
Mississippi	7,705	322,184	318,331	3.3	138.8	137.1
Missouri	18,385	719,638	723,265	4.0	157.6	158.4
Montana	2,830	128,323	123,234	4.1	186.2	178.9
Nebraska	6,655	244,234	240,792	4.6	169.8	167.4
Nevada	1,606	68,494	65,137	3.7	156.0	148.4
New Hampshire	2,355	99,396	98,267	3.4	142.0	140.4
New Jersey	22,175	843,391	826,881	3.2	120.6	118.2
New Mexico	3,331	163,813	161,045	3.4	167.3	164.5
New York	71,708	2,300,161	2,275,273	4.0	126.8	125.4
North Carolina	16,072	702,536	704,400	3.2	140.1	140.5
North Dakota	3,060	126,053	124,957	5.0	206.0	204.2
Ohio	36,454	1,420,322	1,417,121	3.4	134.2	133.9
Oklahoma	9,134	404,958	404,623	3.7	162.1	162.0
Oregon	6,098	294,075	292,660	3.0	147.0	146.3
Pennsylvania	51,873	1,667,337	1,646,499	4.4	142.2	140.4
Rhode Island	5,230	117,609	115,869	5.9	133.5	131.5
South Carolina	9,103	373,382	373,932	3.5	144.5	144.7
South Dakota	3,154	126,521	124,456	4.8	191.7	188.6
Tennessee	14,293	587,215	582,878	3.6	149.9	148.8
Texas	37,446	1,664,087	1,645,084	3.5	153.8	152.1
Utah	2,824	147,752	143,388	2.8	144.0	139.8
Vermont	1,628	66,643	65,897	3.8	155.3	152.3
Virginia	15,418	563,008	552,569	3.5	127.0	124.7
Washington	9,715	493,047	490,893	3.0	153.2	152.5
West Virginia	7,899	313,519	313,486	4.3	172.5	172.4
Wisconsin	16,778	676,207	673,530	4.0	160.7	160.1
Wyoming	1,286	56,988	58,667	4.0	178.6	183.9

Source: U.S. Bureau of the Census: Population estimates. *Current Population Reports*. Series P-25, No. 430. Aug. 1969.

Table 177. EMPLOYEES IN GENERAL HOSPITALS BY STATE: 1968

State	Total employees	Full-time employees (more than 35 hours)	Part-time employees (less than 35 hours)	Full-time employees per 1,000 average daily patients
United States	2,085,024	1,677,040	407,984	2,295
Alabama	29,560	25,819	3,741	2.322
Alaska	2,458	2,289	169	2,291
Arizona	18,644	16,165	2,479	2,565
Arkansas	16,894	14,934	1,960	2,003
California	180,639	152,116	28,523	2,411
Colorado	27,636	22,677	4,959	2,550
Connecticut	32,901	23,654	9,247	2,532
Delaware	4,996	4,139	857	2,633
District of Columbia	17,223	14,619	2,604	2,484
Florida	61,754	54,540	7,214	2,425
Georgia	40,810	36,219	4,591	2,356
Hawaii	5,266	4,895	371	2,038
Idaho	5,858	4,153	1,705	2,108
Illinois	123,688	94,700	28,988	2,077
Indiana	47,255	37,381	9,874	2,224
Iowa	32,761	22,182	10,579	1,879
Kansas	27,253	20,985	6,268	2,131
Kentucky	28,435	24,699	3,736	2,325
Louisiana	32,373	28,552	3,821	2,410
Maine	11,562	8,420	3,142	1 911
Maryland	39,375	32,998	6,377	2,944
Massachusetts	74,390	52,772	21,618	2,637
Michigan	95,096	76,115	18,981	2,426
Minnesota	48,484	31,260	17,224	1,922
Mississippi	17,324	15,724	1,600	2,041
Missouri	51,641	42,108	9,533	2,290
Montana	7,722	5,694	2,028	2,012
Nebraska	18,686	12,392	6,294	1,862
Nevada	4,251	3,748	503	2,334
New Hampshire	7,568	4,889	2,679	2,076
New Jersey	63,406	48,438	14,968	2,184
New Mexico	9,063	8,026	1,037	2,409
New York	216,428	176,811	39,617	2,466
North Carolina	40,219	35,745	4,474	2,224
North Dakota	8,482	6,564	1,918	2,145
Ohio	111,579	87,726	23,853	2,406
Oklahoma	24,762	20,894	3,868	2,287
Oregon	18,894	14,308	4,586	2,346
Pennsylvania	138,113	110,884	27,229	2,138
Rhode Island	14,102	10,133	3,969	1,937
South Carolina	20,943	18,711	2,232	2,055
South Dakota	8,024	5,681	2,343	1,801
Tennessee	37,403	33,206	4,197	2,323
Texas	103,325	89,154	14,171	2,381
Utah	9,217	6,892	2,325	2,441
Vermont	5,630	4,128	1,502	2,536
Virginia	40,401	34,123	6,278	2,213
Washington	29,303	22,325	6,978	2,298
West Virginia	18,948	16,671	2,277	2,111
Wisconsin	50,898	33,089	17,809	1,972
Wyoming	3,381	2,693	688	2,094

Table 178. AVERAGE DAILY PATIENTS, ADMISSIONS AND DISCHARGES FOR SPECIALTY HOSPITALS BY STATE: 1968

State	Number			Number per 1,000 population		
	Average daily patients	Admissions	Discharges	Average daily patients	Admissions	Discharges
United States	519,963	1,443,146	1,424,914	2.6	7.3	7.2
Alabama	5,950	26,829	26,129	1.7	7.7	7.5
Alaska	453	386	402	1.9	1.6	1.7
Arizona	1,417	6,080	5,993	0.9	3.7	3.7
Arkansas	1,630	8,644	8,700	0.8	4.4	4.4
California	34,571	137,615	135,332	1.8	7.3	7.2
Colorado	4,121	26,683	26,729	2.1	13.3	13.3
Connecticut	8,612	22,180	22,192	2.9	7.5	7.5
Delaware	2,202	2,745	2,891	4.2	5.2	5.5
District of Columbia	7,060	28,988	28,978	9.0	36.9	36.9
Florida	11,465	29,258	28,768	1.9	4.8	4.7
Georgia	11,387	39,835	39,716	2.5	8.9	8.9
Hawaii	1,696	13,170	13,228	2.4	18.3	18.4
Idaho	812	2,476	2,488	1.2	3.5	3.5
Illinois	28,063	63,816	63,742	2.6	5.9	5.8
Indiana	12,524	12,865	12,779	2.5	2.5	2.5
Iowa	3,237	9,287	9,191	1.2	3.3	3.3
Kansas	3,570	9,387	8,702	1.6	4.4	3.9
Kentucky	6,895	27,846	28,666	2.2	8.8	9.1
Louisiana	6,181	20,663	21,248	1.7	5.6	5.8
Maine	2,951	2,378	2,016	3.1	2.5	2.1
Maryland	14,125	28,201	27,801	3.9	7.7	7.6
Massachusetts	25,276	100,241	97,899	4.7	18.6	18.1
Michigan	24,843	51,279	51,395	2.9	5.9	5.9
Minnesota	6,195	17,805	16,251	1.7	4.9	4.4
Mississippi	5,558	9,012	9,151	2.4	3.9	3.9
Missouri	12,725	40,650	40,182	2.8	8.9	8.8
Montana	362	2,482	2,432	0.5	3.6	3.5
Nebraska	2,130	12,752	12,246	1.5	8.9	8.5
Nevada	475	2,522	2,525	1.1	5.7	5.8
New Hampshire	347	1,698	2,019	0.5	2.4	2.9
New Jersey	21,232	42,065	41,786	3.0	6.0	6.0
New Mexico	1,127	3,775	3,546	1.2	3.9	3.6
New York	90,483	155,683	150,427	5.0	8.6	8.3
North Carolina	11,201	37,966	35,958	2.2	7.6	7.2
North Dakota	1,634	1,811	2,200	2.7	3.0	3.6
Ohio	21,665	82,330	80,343	2.0	7.8	7.6
Oklahoma	3,587	17,134	16,762	1.4	6.9	6.7
Oregon	3,443	11,304	11,093	1.7	5.7	5.5
Pennsylvania	35,742	88,695	85,447	3.0	7.6	7.3
Rhode Island	2,315	16,221	15,990	2.6	18.4	18.1
South Carolina	6,709	11,123	10,706	2.6	4.3	4.1
South Dakota	1,927	2,903	2,978	2.9	4.4	4.5
Tennessee	9,607	34,809	33,783	2.5	8.9	8.6
Texas	21,062	74,849	76,285	1.9	6.9	7.1
Utah	2,572	8,520	8,510	2.5	8.3	8.3
Vermont	1,464	1,428	1,238	3.4	3.3	2.9
Virginia	13,781	31,835	30,458	3.1	7.2	6.9
Washington	4,393	23,745	22,317	1.4	7.4	6.9
West Virginia	5,326	7,455	7,422	2.9	4.1	4.1
Wisconsin	12,790	29,922	36,372	3.0	7.1	8.6
Wyoming	1,070	1,300	1,502	3.4	4.1	4.7

Source: U.S. Bureau of the Census: Population estimates. *Current Population Reports*. Series P-25, No. 430. Aug. 1969.

Table 179. EMPLOYEES IN SPECIALTY HOSPITALS BY STATE: 1968

State	Total employees	Full-time employees (more than 35 hours)	Part-time employees (less than 35 hours)	Full-time employees per 1,000 average daily patients
United States	431,829	393,381	38,448	757
Alabama	4,404	4,248	156	714
Alaska	505	482	23	1,064
Arizona	1,226	1,155	71	815
Arkansas	2,146	2,020	126	1,239
California	34,856	29,791	5,065	862
Colorado	6,494	5,743	751	1,394
Connecticut	8,761	7,672	1,089	891
Delaware	1,844	1,717	127	780
District of Columbia	6,632	6,427	205	910
Florida	7,769	7,468	301	651
Georgia	5,889	5,698	191	500
Hawaii	1,922	1,829	93	1,078
Idaho	698	670	28	825
Illinois	22,710	20,093	2,617	716
Indiana	7,927	7,485	442	598
Iowa	3,815	3,434	381	1,061
Kansas	4,282	4,038	244	1,131
Kentucky	5,959	5,549	410	805
Louisiana	4,511	4,178	333	676
Maine	1,330	1,290	40	437
Maryland	12,834	11,883	951	841
Massachusetts	27,936	24,539	3,397	971
Michigan	19,016	17,008	2,008	685
Minnesota	5,632	4,780	852	772
Mississippi	2,772	2,692	80	484
Missouri	12,079	11,093	986	872
Montana	519	257	262	710
Nebraska	4,375	3,658	717	1,717
Nevada	344	339	5	714
New Hampshire	509	371	138	1,069
New Jersey	16,041	14,694	1,347	692
New Mexico	1,207	1,135	72	1,007
New York	69,698	66,017	3,681	730
North Carolina	7,691	7,359	332	657
North Dakota	1,083	1,033	50	632
Ohio	17,868	16,379	1,489	756
Oklahoma	3,258	2,817	441	785
Oregon	2,651	2,366	285	687
Pennsylvania	31,422	28,040	3,382	785
Rhode Island	2,241	1,741	500	752
South Carolina	3,144	2,921	223	435
South Dakota	1,472	1,386	86	719
Tennessee	7,318	7,104	214	739
Texas	17,216	16,090	1,126	764
Utah	1,808	1,564	244	608
Vermont	987	934	53	638
Virginia	8,047	7,676	371	557
Washington	5,105	4,486	619	1,021
West Virginia	2,812	2,700	112	507
Wisconsin	10,167	8,491	1,676	664
Wyoming	897	841	56	786

CHAPTER 37

Nursing Care and Related Homes

The nursing home is a relatively new institution in the United States. "Prior to the thirties, only a few such homes existed. With the enactment of the Social Security Act in 1935, which made Federal funds available to the needy aged, the number of proprietary boarding and nursing homes for elderly persons began to flourish and public almshouses subsequently declined." (*78*) The growing number of elderly persons, changes in the pattern of illness resulting from advances in medical technology, and changes in family living arrangements have resulted in a growing demand for the provision of limited medical and nursing care outside of hospitals.

The 1965 amendments to the Social Security Act (Medicare) provides for the financing of up to 100 days of extended care services for persons 65 and over in a certified facility during a single spell of illness. This has provided an impetus to the development of new nursing care facilities and the modification of existing facilities, since extended care represented a new level of care designed to provide skilled nursing services in a high quality extended care facility at less cost than in a hospital (*79*).

The 1967 amendments to the Social Security Act (Medicaid) also recognized an additional level of patient care. This is care in an intermediate care facility for aged, blind, and disabled persons who are eligible for financial assistance under Titles I, X, IV or XVI of the Social Security Act. While care in a skilled nursing home is closely related to care in an extended care facility, intermediate care, as a covered service, is a new concept. Care at this level is broadly defined as less than skilled nursing care but more than domiciliary care (*80*). Recognition of this type of facility became necessary because many elderly persons need long-term institutional care although they do not need the comprehensive services available in skilled nursing homes. This provision should reduce the cost of care by allowing States to relocate large numbers of medicaid recipients who are now in skilled nursing homes in lower cost institutions.

In 1939, the first national count of nursing homes by the Bureau of the Census indicated that there were 1,200 nursing, convalescent, and rest homes with approximately 25,000 beds (*81*). According to the 1954 national inventory of nursing homes and related facilities conducted by the Division of Hospital and Medical Facilities of the Public Health Service, there was a total of about 25,000 homes of all types with approximately 450,000 beds. These facilities range from the boarding home for aged persons which provides only the simplest supportive services to the professional type of nursing home providing highly skilled and intensive nursing care (*78*).

In 1967, there were 19,141 establishments providing nursing or personal care. These consisted of 10,636 nursing care homes, 3,853 personal care with nursing care homes, 4,396 personal care without nursing care homes, and 256 domiciliary care homes. California led the Nation in the number of nursing care and related homes followed by Ohio and New York. In 11 States three out of four of the nursing care and related homes were classified as "nursing care" homes (table 180).

The number of beds in nursing care and related homes in 1967 has increased by almost 50 percent since 1963. In 1967, the 584,052 beds in nursing care homes accounted for 70 percent of the total beds in all kinds of nursing care and related homes for the chronically ill and aged. An additional 252,502 beds were available in homes providing personal care with nursing, personal care, and domiciliary care (table 181).

Nationally, there were approximately 45 beds per 1,000 civilian population. However, there is considerable variation among the States. Bed to population ratios range from a high of 81.4 for Iowa, followed by North Dakota and Minnesota (76.7 and 73.0, respectively) to a low of 11.5 per 1,000 beds in West Virginia (table 182).

A little less than half of the nursing care and related homes had less than 25 beds and only 9 percent had more than 99 beds. Nursing care homes on the average maintained more beds than

the various types of personal and domiciliary facilities (table 183).

As of 1967, 77 percent of nursing care and related homes were proprietary, i.e., privately owned and operated for profit. Voluntary nonprofit homes, including those owned and operated by fraternal groups and religious orders, constituted 15 percent of all "homes." The "homes" owned and operated by public agencies (local, State, and Federal governments) comprised an additional 8 percent (table 184).

In 1967, there were almost 400,000 persons employed full time in 19,141 nursing care and related homes in the United States. Those employees were serving over three-quarters of a million residents (table 185).

Although some States had licensure programs for nursing homes in the early 1920's, the majority of the States did not enact statutes until after World War II. Nursing homes are required to be licensed currently in each of the 50 States and the District of Columbia—in 46 by the departments of health, in three by the departments of welfare, in one by the State Department of Hospitals, and in one by the Department of Institutions and Agencies. The minimum standards, rules, and regulations for nursing homes and related facilities in all 50 States show little uniformity in terminology, definitions, or in requirements. As used in the various State regulations, the term "nursing home" can mean anything from a facility which provides care comparable to that provided by a hospital (excluding surgery) to a facility which offers no more than room and board of limited quality (*82*).

Unlike licensure, the accreditation program is voluntary for the various types of nursing homes. Previous to 1966, two national organizations, the American Hospital Association and the National Council for Accreditation of Nursing Homes, approved or accredited health care facilities other than hospitals in all States. In California, a third organization, the California Commission for the Accreditation of Nursing Homes and Related Facilities also initiated voluntary accreditation standards. In 1966, the Joint Commission on Accreditation of Hospitals undertook in addition to hospitals, the responsibility for the accreditation of nursing and personal facilities. Accreditation by the JCAH may be granted to extended care facilities, nursing care facilities, and resident care facilities for 3 years or 1 year, or it may be withheld, depending upon the quality of care provided. At the end of the accreditation period (either 3 years or 1 year), the facilities request a resurvey to determine accreditation eligibility. A facility denied accreditation may request another survey to determine its accreditation eligibility, usually after 6 months have elapsed from the denial survey (*83*). If qualified, the facility is then accredited.

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(*83*) Joint Commission on Accreditation of Hospitals: *Standards for Accreditation of Extended Care Facilities, Nursing Care Facilities and Resident Care Facilities*. Chicago, January 1968.

Table 180. NURSING CARE AND RELATED HOMES, BY TYPE AND STATE: 1967

Location	Total	Nursing care	Personal care		Domiciliary care
			With nursing care	Without nursing care	
United States	19,141	10,636	3,853	4,396	256
Alabama	152	128	19	5	—
Alaska	4	3	—	1	—
Arizona	78	53	15	9	1
Arkansas	177	165	9	3	—
California	2,973	974	451	1,471	77
Colorado	164	136	18	10	—
Connecticut	366	224	57	72	13
Delaware	33	23	6	4	—
District of Columbia	85	34	29	21	1
Florida	327	244	43	34	6
Georgia	198	154	26	17	1
Hawaii	88	18	24	46	—
Idaho	56	44	4	7	1
Illinois	914	525	198	184	7
Indiana	471	315	80	68	8
Iowa	731	365	172	189	5
Kansas	473	171	218	82	2
Kentucky	294	109	125	57	3
Louisiana	188	173	12	3	—
Maine	293	128	57	97	11
Maryland	198	147	33	14	4
Massachusetts	952	631	155	164	2
Michigan	517	367	85	57	8
Minnesota	485	283	74	122	6
Mississippi	107	61	22	24	—
Missouri	436	266	124	42	4
Montana	82	45	20	15	2
Nebraska	279	97	121	59	2
Nevada	22	7	4	11	—
New Hampshire	137	92	32	12	1
New Jersey	507	239	71	183	14
New Mexico	58	28	9	20	1
New York	1,081	571	197	293	20
North Carolina	666	109	227	319	11
North Dakota	92	29	26	37	—
Ohio	1,126	779	233	113	1
Oklahoma	445	375	57	12	1
Oregon	271	162	38	69	2
Pennsylvania	789	522	178	85	4
Rhode Island	170	87	25	56	2
South Carolina	93	75	12	6	—
South Dakota	125	62	40	23	—
Tennessee	219	150	31	31	7
Texas	866	661	138	61	6
Utah	130	65	47	18	—
Vermont	121	70	17	27	7
Virginia	269	132	59	69	9
Washington	262	193	51	15	3
West Virginia	64	42	15	7	—
Wisconsin	477	289	142	44	2
Wyoming	30	14	7	8	1

Table 181. BEDS MAINTAINED IN NURSING CARE AND RELATED HOMES BY STATE: 1967

State	Total beds	Nursing care	Personal care		Domiciliary care
			With nursing care	Without nursing care	
United States	836,554	584,052	181,096	66,787	4,619
Alabama	8,806	7,939	819	48	—
Alaska	139	76	—	63	—
Arizona	3,998	2,976	841	147	34
Arkansas	10,478	9,911	472	95	—
California	85,106	53,000	16,015	15,442	648
Colorado	10,918	9,170	1,475	273	—
Connecticut	15,924	11,998	2,493	1,283	150
Delaware	1,429	970	376	83	—
District of Columbia	2,071	913	1,016	138	4
Florida	22,139	16,774	4,599	651	115
Georgia	11,236	9,265	1,696	235	40
Hawaii	1,327	809	178	340	—
Idaho	2,978	2,708	162	78	30
Illinois	49,478	32,917	12,086	4,052	423
Indiana	21,929	13,497	6,535	1,349	548
Iowa	27,998	15,537	8,318	4,076	67
Kansas	17,372	8,438	7,747	1,167	20
Kentucky	11,841	5,749	4,648	1,395	49
Louisiana	10,313	9,691	518	104	—
Maine	5,704	3,598	1,110	923	73
Maryland	10,409	7,891	2,276	123	119
Massachusetts	38,604	30,697	5,316	2,563	28
Michigan	28,739	21,694	5,742	1,041	262
Minnesota	28,837	21,715	4,642	2,282	198
Mississippi	3,766	2,736	708	322	—
Missouri	22,860	15,009	6,821	971	59
Montana	3,170	2,256	730	172	12
Nebraska	11,560	6,019	4,530	998	13
Nevada	749	484	47	218	—
New Hampshire	4,021	3,126	762	129	4
New Jersey	22,888	14,728	4,213	3,676	271
New Mexico	1,964	1,587	188	181	8
New York	60,341	41,740	11,876	6,061	664
North Carolina	14,181	5,541	5,458	3,070	112
North Dakota	4,909	2,083	1,449	1,377	—
Ohio	48,059	34,108	11,643	2,298	10
Oklahoma	19,374	17,321	1,946	104	3
Oregon	13,518	9,037	3,245	1,214	22
Pennsylvania	47,331	33,457	12,108	1,675	91
Rhode Island	4,876	3,372	784	714	6
South Carolina	4,720	3,968	667	85	—
South Dakota	5,198	3,236	1,704	258	—
Tennessee	8,449	6,571	1,276	510	92
Texas	43,988	36,040	6,105	1,665	178
Utah	3,777	2,458	1,048	271	—
Vermont	2,682	1,908	397	322	55
Virginia	10,062	6,229	2,873	871	89
Washington	17,378	12,303	4,711	301	63
West Virginia	2,186	1,519	531	136	—
Wisconsin	25,793	18,763	5,866	1,127	37
Wyoming	982	520	330	110	22

Table 182. NUMBER OF BEDS PER 1,000 POPULATION 65 AND OVER MAINTAINED IN NURSING CARE AND RELATED HOMES BY STATE: 1967

State	Total beds	Nursing care	Personal care		Domiciliary care
			With nursing care	Without nursing care	
United States	44.5	31.0	9.6	3.6	0.2
Alabama	29.2	26.3	2.7	0.2	—
Alaska	23.2	12.7	—	10.5	—
Arizona	31.0	23.1	6.5	1.1	0.3
Arkansas	47.2	44.6	2.1	0.4	—
California	51.7	32.2	9.7	9.4	0.4
Colorado	61.7	51.8	8.3	1.5	—
Connecticut	58.5	44.1	9.2	4.7	0.6
Delaware	34.9	23.7	9.2	2.0	—
District of Columbia	30.0	13.2	14.7	2.0	0.1
Florida	28.9	21.9	6.0	0.8	0.1
Georgia	33.2	27.4	5.0	0.7	0.1
Hawaii	34.0	20.7	4.6	8.7	—
Idaho	46.5	42.3	2.5	1.2	0.5
Illinois	46.7	31.1	11.4	3.8	0.4
Indiana	46.3	28.5	13.8	2.8	1.2
Iowa	81.4	45.2	24.2	11.8	0.2
Kansas	67.3	32.7	30.0	4.5	0.1
Kentucky	36.5	17.7	14.3	4.3	0.2
Louisiana	36.6	34.4	1.8	0.4	—
Maine	49.6	31.3	9.7	8.0	0.6
Maryland	39.0	29.6	8.5	0.5	0.4
Massachusetts	62.7	49.8	8.6	4.2	0.0
Michigan	39.6	29.9	7.9	1.4	0.4
Minnesota	73.0	55.0	11.8	5.8	0.5
Mississippi	17.8	13.0	3.4	1.5	—
Missouri	42.6	27.9	12.7	1.8	0.1
Montana	47.3	33.7	10.9	2.6	0.2
Nebraska	65.3	34.0	25.6	5.6	0.1
Nevada	28.8	18.6	1.8	8.4	—
New Hampshire	52.2	40.6	9.9	1.7	0.1
New Jersey	35.1	22.6	6.5	5.6	0.4
New Mexico	30.7	24.8	2.9	2.8	0.1
New York	31.7	21.9	6.2	3.2	0.3
North Carolina	37.4	14.6	14.4	8.1	0.3
North Dakota	76.7	32.5	22.6	21.5	—
Ohio	50.1	35.6	12.1	2.4	0.0
Oklahoma	69.7	62.3	7.0	0.4	0.0
Oregon	64.7	43.2	15.5	5.8	0.1
Pennsylvania	38.7	27.4	9.9	1.4	0.1
Rhode Island	50.3	34.8	8.1	7.4	0.1
South Carolina	26.8	22.5	3.8	0.5	—
South Dakota	66.6	41.5	21.8	3.3	—
Tennessee	23.6	18.4	3.6	1.4	0.3
Texas	48.9	40.0	6.8	1.9	0.2
Utah	54.0	35.1	15.0	3.9	—
Vermont	57.1	40.6	8.4	6.9	1.2
Virginia	29.9	18.5	8.6	2.6	0.3
Washington	57.4	40.6	15.5	1.0	0.2
West Virginia	11.5	8.0	2.8	0.7	—
Wisconsin	57.1	41.5	13.0	2.5	0.1
Wyoming	33.9	17.9	11.4	3.8	0.8

Source: U.S. Bureau of the Census: Population estimates. *Current Population Reports*. Series P-25, No. 420. April, 1969.

Table 183. NUMBER AND PERCENT DISTRIBUTION OF NURSING CARE AND RELATED HOMES BY BED SIZE: 1967

Bed size	Total homes	Nursing care	Personal care		Domiciliary care
			With nursing care	Without nursing care	
	NUMBER				
Total	19,141	10,636	3,853	4,396	256
Under 25 beds	8,522	2,673	1,876	3,754	219
25–49	4,868	3,490	877	476	25
50–74	2,697	2,146	438	108	5
75–99	1,281	1,060	199	20	2
100–199	1,443	1,073	336	33	1
200–299	216	128	82	5	1
300–499	91	51	37	—	3
500–999	16	10	6	—	—
1,000 beds or more	7	5	2	—	—
	PERCENT DISTRIBUTION				
Total	100.0	100.0	100.0	100.0	100.0
Under 25 beds	44.6	25.1	48.6	85.3	85.4
25–49	25.4	32.8	22.7	10.8	9.8
50–74	14.1	20.2	11.4	2.5	2.0
75–99	6.7	10.0	5.2	0.5	0.8
100–199	7.5	10.1	8.7	0.8	0.4
200–299	1.1	1.2	2.1	0.1	0.4
300–499	0.5	0.5	1.0	—	1.2
500–999	0.1	0.1	0.2	—	—
1,000 beds or more	0.0	0.0	0.1	—	—

Table 184. OWNERSHIP OF NURSING CARE AND RELATED HOMES: 1967

Ownership	Total homes	Nursing care	Personal care		Domiciliary care
			With nursing care	Without nursing care	
Total	19,141	10,636	3,853	4,396	256
Government	1,462	533	311	582	36
Federal	25	6	7	12	—
State-local	1,437	527	304	570	36
Proprietary	14,831	8,878	2,409	3,356	188
Nonprofit	2,848	1,225	1,133	458	32
Church	999	414	450	126	9
Other	1,849	811	683	332	23

Table 185. RESIDENTS AND FULL-TIME EMPLOYEES IN NURSING CARE AND RELATED HOMES BY STATE: 1967

State	Number		Number of residents per 1,000 population 65 and over	Number of full-time employees per 1,000 residents
	Residents	Employees (full-time)		
United States	756,239	383,158	40.2	507
Alabama	8,231	5,373	27.3	653
Alaska	123	60	20.5	488
Arizona	3,780	1,992	29.3	527
Arkansas	9,762	4,613	44.0	473
California	77,284	38,566	47.0	499
Colorado	10,192	5,554	57.6	545
Connecticut	14,216	7,214	52.3	507
Delaware	1,283	765	31.3	596
District of Columbia	1,910	1,123	27.7	583
Florida	19,318	11,228	25.2	581
Georgia	10,419	5,872	30.8	564
Hawaii	1,223	628	31.4	513
Idaho	2,754	1,620	43.0	588
Illinois	44,623	21,931	42.1	491
Indiana	19,266	10,255	40.6	532
Iowa	25,071	10,057	72.9	401
Kansas	15,692	7,180	60.8	458
Kentucky	10,689	4,706	33.0	440
Louisiana	9,167	5,238	32.5	571
Maine	5,222	2,638	45.4	505
Maryland	9,474	5,454	35.5	576
Massachusetts	35,566	16,291	57.7	458
Michigan	26,599	15,685	36.6	590
Minnesota	27,009	11,111	68.4	411
Mississippi	3,153	1,742	14.9	552
Missouri	20,680	10,189	38.5	493
Montana	2,838	1,380	42.4	486
Nebraska	10,174	4,164	57.5	409
Nevada	684	310	26.3	453
New Hampshire	3,541	1,741	46.0	492
New Jersey	20,392	11,074	31.2	543
New Mexico	1,699	1,140	26.5	671
New York	54,844	31,054	28.8	566
North Carolina	13,014	5,814	34.3	447
North Dakota	4,563	2,041	71.8	447
Ohio	42,650	20,521	44.5	481
Oklahoma	17,213	8,315	61.9	483
Oregon	12,279	5,238	58.8	427
Pennsylvania	42,986	24,398	35.2	568
Rhode Island	4,569	1,961	47.1	429
South Carolina	4,383	2,720	24.9	621
South Dakota	4,780	2,022	61.3	423
Tennessee	7,677	4,300	21.4	560
Texas	37,778	20,688	42.0	548
Utah	3,414	1,439	48.8	421
Vermont	2,488	1,332	52.9	535
Virginia	9,130	5,143	27.2	563
Washington	16,016	7,031	52.9	439
West Virginia	1,992	1,169	10.5	587
Wisconsin	23,675	10,713	52.4	453
Wyoming	804	365	27.7	454

Source: U.S. Bureau of the Census: Population estimates. *Current Population Reports*. Series P-25, No. 420. April 1969.

CHAPTER 38

Other Inpatient Health Facilities

Persons who are not necessarily ill or aged are residents of facilities classified by the MFC as "other inpatient health facilities." These house some 348,254 individuals in approximately 3,300 facilities. Included are residential schools or homes for the deaf, blind, physically handicapped, or emotionally disturbed; homes for unwed mothers; orphanages; homes for dependent children; and all facilities for the mentally retarded including hospitals and homes or resident schools.

Information on the nature and extent to which these types of facilities are licensed is being assembled by the National Center for Health Statistics, but the results are not yet available. The information which is available deals with an undifferentiated category of State regulatory or control responsibilities which are described as such rather than as specific functions in the following sections of this chapter. These responsibilities assume different forms in different States and include such functions as approval, inspection, licensing, and certification.

Facilities for the Deaf or Blind

Since the early part of the 19th century, education for the deaf has been a public responsibility in the United States. The first school was founded in Hartford, Conn., in 1817. In 1818, the Institution for the Instruction of the Deaf and Dumb was opened in New York under private auspices. Shortly there-after, however, it was financed from local public funds. The first State residential school for the deaf was established by Kentucky in 1823 (*84*). Today, in States having public residential schools for the deaf, qualified children are admitted without charge.

The first schools for the blind in the United States were organized between 1829 and 1832 in New York, Pennsylvania, and Massachusetts. Ohio established the first State school for the blind in 1837 (*85*). Today, every State has a residential school for the blind, and/or has special programs in its own public schools, or if neither of these, has contract arrangements with schools for the blind in neighboring States.

The 1960 Census of Population showed 170 homes and schools for the blind and deaf with 18,805 residents (*86*). Data from the 1967 MFC indicated 138 such facilities, with 23,621 residents and 12,674 full-time employees to serve them (tables 186, 187, and 190).

Only four States have responsibilities for the control of homes or schools for the blind, and three States regulate homes or schools for the deaf.

Facilities for Unwed Mothers

One of the first homes for unwed mothers was the Talitha Cumi Maternity Home and Hospital established in Boston in 1836. In the 1850's similar establishments were opened under Catholic auspices in Boston and St. Louis. By 1890 Charles Crittenton had begun to establish a national organization of homes in each State for unwed mothers who sought shelter. During this same period of time, the Salvation Army also provided facilities for the care of unwed mothers. In 1887 "rescue homes" were established in New York, Michigan, and California (*84*). Today, many of the institutions, besides providing domiciliary care for unwed mothers and their children, provide social services and medical care which include prenatal, delivery, and postnatal care within the institution. Often when the institution cannot provide these services, arrangements are made for women to receive such services in the community.

There were 108 homes for unwed mothers with 3,500 residents counted in the 1960 Census of Population (*86*). According to the 1967 MFC there were 181 facilities for unwed mothers, with 5,183 residents and 2,066 full-time employees to serve them (tables 186, 187, and 190).

Forty-eight States regulate homes for unwed mothers. In most States the welfare department is responsible for the regulation of such facilities.

Facilities for the Physically Handicapped

Public institutions for the crippled or physically handicapped were organized at a much later date in the United States than were those for orphans, and deaf, blind, and mentally retarded persons. Until the late 19th century, any care given to the physically handicapped was under private auspices and was limited to refuge. The idea of education and rehabilitation of the handicapped is a relatively modern principle. Between 1897 and 1899 the legislatures of Minnesota and Nebraska enacted the first laws in the Nation for the establishment of State owned and maintained institutions for the physically handicapped (*84*). Today, schools which offer programs in social development, speech, physical, and occupational therapy for persons with orthopedic and other handicaps have been established in a number of States.

In 1967, there were 30 such facilities with 1,345 residents and 1,000 full-time employees (tables 186, 187, and 190).

Four States have rules and regulations that control homes or schools for the physically handicapped.

In October 1967, the Commission on Accreditation of Rehabilitation Facilities, a program of the JCAH, adapted voluntary accreditation standards for rehabilitation facilities. Any rehabilitation facility may request an accreditation survey by the JCAH. An accredited facility receives a certificate of accreditation. Accreditation is granted for 3 years, or for 1 year, or it may be withheld. At the end of the accreditation period, the rehabilitation facility is automatically surveyed to reevaluate its accreditation status. The 1 year accreditation is only renewable once (*87*). A rehabilitation facility that has been refused accreditation may apply for another survey to determine its accreditation status. By the end of 1968, 34 facilities had been awarded accreditation.

Facilities for the Mentally Retarded

The first public institution for the mentally retarded in the United States, established in Massachusetts by an 1848 act, was a school for the teaching of "idiots". In 1851 a State school was opened in Albany, N.Y., for the purpose of educating mental defectives. The term "asylum" gradually replaced the term "school" at the turn of the 19th century, and in 1893 the Custodial Asylum for Unteachable Idiots was founded in Rome, N.Y. (*88*). Progress has been made in the care of the mentally retarded. Today, a number of State institutions have changed from large isolated facilities to smaller units closer to the homes of potential patients. They now offer not merely a "custodial" service, but therapeutic services, and are closely linked to appropriate medical, educational, and welfare programs in the community (*89*).

The 1960 Census of Population showed 720 homes and schools for the mentally retarded with a total of 175,000 residents (*86*). In 1967, according to the MFC, there were about 1,500 facilities for the mentally retarded, with 218,871 residents and 113,098 staff members employed full-time (tables 186, 187, and 190). Almost three-quarters of these facilities had less than 25 beds (table 188). About one-fifth of all facilities for the mentally retarded were publicly owned (table 189).

Forty-six States regulate homes for the mentally retarded. In 21 of these States such facilities are regulated by public welfare departments; in 10, by health departments; in 8, by mental health departments; and in 7, by other State agencies.

In 1969, the JCAH has been involved in establishing basic policies for the implementation of an accreditation program for facilities for the mentally retarded.

Facilities for Dependent Children and Orphanages

The first institution established for dependent children was opened by the Order of the Ursuline Sisters in New Orleans around 1730. The first public institution in the United States for dependent children was established by the city of Charleston, S.C., early in the 18th century, and the first State institution, by Massachusetts in 1866. Separate provisions for institutional care of children were made by several large cities after 1816, but usually these institutions were administered by the officials responsible for keeping the almshouses, and were often located on the same grounds. The principle of separate facilities for children was only gradually adopted in the late 19th century (*84*).

The 1960 Census of Population showed almost 1,500 homes for dependent and rejected children, with approximately 73,300 residents (*86*). In 1967, according to the MFC, there were 1,059 homes for dependent children or orphanages, with 58,784 residents being served by 23,695 full-time personnel (tables 186, 187, and 190).

Forty-nine States regulate homes for dependent children. In 39 of these States, the welfare department is the regulating agency.

Other Facilities

Homes for alcoholics, sheltered care homes, boarding homes, correctional facilities, and other similar types of facilities which have health functions are the remaining other inpatient health facilities in the MFC. In 1967 there were 404 such facilities, with 40,450 residents and 11,455 full-time employees to serve them (tables 186, 187, and 190).

There is much variety among the laws of the States regarding the location of the regulating responsibility, the types of facilities subject to regulation, and the requirements for regulation of such facilities.

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Table 186. OTHER INPATIENT HEALTH FACILITIES, BY TYPE AND STATE: 1967

Location	Total other inpatient facilities	Deaf or blind	Unwed mothers	Physically handicapped	Mentally retarded	Orphanage or dependent children	Other
United States	3,298	138	181	30	1,486	1,059	404
Alabama	29	1	2	1	5	18	2
Alaska	23	—	1	—	7	13	2
Arizona	64	1	4	—	11	11	37
Arkansas	25	3	1	—	8	12	1
California	589	6	8	12	410	42	111
Colorado	42	2	2	—	15	17	6
Connecticut	35	3	2	—	21	6	3
Delaware	13	—	1	—	6	5	1
District of Columbia	19	3	2	—	6	4	4
Florida	65	2	10	—	22	26	5
Georgia	59	4	2	—	16	32	5
Hawaii	27	1	1	—	24	1	—
Idaho	7	1	1	—	3	2	—
Illinois	156	4	9	—	75	59	9
Indiana	59	2	5	—	14	34	4
Iowa	67	2	5	1	45	10	4
Kansas	42	2	2	1	23	13	1
Kentucky	54	2	3	1	8	39	1
Louisiana	56	5	7	1	18	22	3
Maine	33	2	1	1	19	8	2
Maryland	32	2	3	1	15	9	2
Massachusetts	53	5	1	—	24	10	13
Michigan	92	4	4	—	49	32	3
Minnesota	58	3	3	1	42	3	6
Mississippi	23	3	2	—	7	8	3
Missouri	64	5	2	—	32	21	4
Montana	14	1	1	—	3	6	3
Nebraska	30	2	1	—	8	15	4
Nevada	7	—	—	—	2	2	3
New Hampshire	19	1	—	—	6	10	2
New Jersey	74	3	7	1	34	20	9
New Mexico	60	2	1	—	7	13	37
New York	221	19	17	—	87	69	29
North Carolina	70	4	2	1	24	34	5
North Dakota	13	2	2	1	5	2	1
Ohio	174	4	8	1	81	73	7
Oklahoma	57	2	1	—	20	26	8
Oregon	26	2	4	—	13	2	5
Pennsylvania	209	8	5	2	95	87	12
Rhode Island	11	1	1	—	2	5	2
South Carolina	29	1	1	—	5	21	1
South Dakota	29	2	1	—	8	7	11
Tennessee	59	2	5	—	13	36	3
Texas	147	3	19	2	37	75	11
Utah	32	1	—	—	23	5	3
Vermont	13	1	1	—	1	3	4
Virginia	56	2	5	1	16	30	2
Washington	47	2	8	1	19	15	2
West Virginia	28	1	5	—	6	13	3
Wisconsin	80	4	2	—	40	29	5
Wyoming	7	—	—	—	3	4	—

Table 187. RESIDENTS IN OTHER INPATIENT HEALTH FACILITIES BY TYPE AND STATE: 1967

Location	Total other inpatient facilities	Deaf or blind	Unwed mothers	Physically handicapped	Mentally retarded	Orphanage or dependent children	Other
United States	348,254	23,621	5,183	1,345	218,871	58,784	40,450
Alabama	3,626	70	81	38	2,360	961	116
Alaska	505	—	10	—	244	248	3
Arizona	12,914	357	5[illegible]	—	1,182	477	10,839
Arkansas	1,893	477	35	—	335	681	365
California	22,854	1,196	285	327	16,331	1,713	3,002
Colorado	3,816	312	131	—	2,277	657	439
Connecticut	5,692	619	66	—	4,583	333	91
Delaware	868	—	20	—	697	142	9
District of Columbia	999	58	49	—	93	677	122
Florida	7,333	773	180	—	5,186	1,129	65
Georgia	4,885	1,036	80	—	2,041	1,575	153
Hawaii	1,026	53	30	—	938	5	—
Idaho	979	150	24	—	748	57	—
Illinois	17,396	718	507	—	12,254	3,552	365
Indiana	6,890	807	115	—	4,288	1,616	64
Iowa	4,591	299	90	6	3,574	454	168
Kansas	3,310	385	26	190	2,389	312	8
Kentucky	3,616	415	60	64	1,471	1,481	125
Louisiana	5,397	756	228	160	3,021	1,009	223
Maine	2,001	160	40	—	1,385	237	179
Maryland	8,291	620	180	13	7,062	397	19
Massachusetts	8,155	621	35	—	6,139	616	744
Michigan	14,668	595	121	—	12,489	1,235	228
Minnesota	10,248	423	92	51	9,399	37	246
Mississippi	2,836	447	59	—	1,239	525	566
Missouri	5,384	697	36	—	3,509	717	425
Montana	1,767	85	25	—	954	569	134
Nebraska	4,656	224	28	—	2,902	1,339	163
Nevada	126	—	—	—	14	98	14
New Hampshire	1,678	100	—	—	1,178	355	45
New Jersey	7,695	499	204	42	5,346	1,267	337
New Mexico	8,216	335	16	—	646	550	6,669
New York	42,724	2,078	505	—	30,692	6,539	2,910
North Carolina	8,104	1,268	77	77	3,912	2,648	122
North Dakota	1,777	118	46	65	1,371	85	92
Ohio	17,658	575	334	33	11,994	3,907	815
Oklahoma	6,175	337	34	—	2,821	1,924	1,059
Oregon	4,617	298	134	—	3,114	66	1,005
Pennsylvania	24,216	1,211	91	190	15,820	5,211	1,693
Rhode Island	728	85	22	—	110	393	118
South Carolina	4,971	469	42	—	3,017	1,387	56
South Dakota	5,166	177	14	—	1,324	1,027	2,624
Tennessee	5,388	541	131	—	2,373	2,278	65
Texas	18,103	805	476	48	11,249	5,029	496
Utah	3,360	177	—	—	486	147	2,550
Vermont	1,110	101	20	—	708	142	139
Virginia	6,368	756	104	24	3,877	1,481	126
Washington	1,443	437	89	17	585	295	20
West Virginia	2,115	332	94	—	916	380	93
Wisconsin	9,136	569	58	—	7,587	681	241
Wyoming	784	—	—	—	641	143	—

Table 188. NUMBER AND PERCENT DISTRIBUTION OF OTHER INPATIENT HEALTH FACILITIES BY BED SIZE: 1967

Bed Size	Total other inpatient facilities	Mental retarda-tion	Other	Bed Size	Total other inpatient facilities	Mental retarda-tion	Other
	NUMBER				PERCENT DISTRIBUTION		
Total	3,298	1,486	1,812	Total	100.0	100.0	100.0
Under 25 beds	2,794	1,077	1,717	Under 25 beds	84.8	72.4	94.7
25–49	196	132	64	25–49	5.9	8.9	3.5
50–74	70	52	18	50–74	2.1	3.5	1.0
75–99	34	31	3	75–99	1.0	2.1	0.2
100–199	50	46	4	100–199	1.5	3.1	0.2
200–299	16	13	3	200–299	0.5	0.9	0.2
300–499	25	22	3	300–499	0.8	1.5	0.2
500–999	31	31	—	500–999	0.9	2.1	—
1,000 beds or more	82	82	—	1,000 beds or more	2.5	5.5	—

Table 189. OWNERSHIP OF OTHER INPATIENT HEALTH FACILITIES: 1967

Ownership	Total other inpatient facilities	Mental retarda-tion	Other
Total	3,298	1,486	1,812
Government	748	331	417
Federal	98	15	83
State-local	650	316	334
Proprietary	607	535	72
Nonprofit	1,943	620	1,323
Church	697	179	518
Other	1,246	441	805

Table 190. FULL-TIME EMPLOYEES IN OTHER INPATIENT HEALTH FACILITIES BY TYPE AND STATE: 1967

Location	Total other inpatient facilities	Deaf or blind	Unwed mothers	Physically handicapped	Mentally retarded	Orphanage or dependent children	Other
United States	163,988	12,674	2,066	1,000	113,098	23,695	11,455
Alabama	1,224	8	53	28	707	380	48
Alaska	219	—	2	—	135	64	18
Arizona	2,679	154	26	—	538	129	1,832
Arkansas	896	243	5	—	217	181	250
California	16,952	630	118	98	14,354	833	919
Colorado	2,240	132	44	—	1,416	330	318
Connecticut	3,016	337	23	—	2,456	138	62
Delaware	470	—	14	—	392	60	4
District of Columbia	677	62	22	—	56	497	40
Florida	4,494	356	44	—	3,690	385	19
Georgia	2,054	369	17	—	1,166	456	46
Hawaii	525	45	10	—	468	2	—
Idaho	482	76	6	—	379	21	—
Illinois	9,060	540	228	—	6,623	1,509	160
Indiana	3,387	399	39	—	2,361	575	13
Iowa	2,149	256	30	3	1,497	294	69
Kansas	2,459	184	7	332	1,819	114	3
Kentucky	1,635	213	17	25	931	420	29
Louisiana	3,089	337	117	96	2,132	347	60
Maine	1,024	108	12	4	745	91	64
Maryland	4,214	237	79	6	3,687	196	9
Massachusetts	3,785	327	21	—	2,822	341	274
Michigan	6,862	262	39	—	5,940	547	74
Minnesota	4,460	223	32	40	3,882	12	271
Mississippi	772	111	31	—	428	127	75
Missouri	2,593	435	11	—	1,655	283	209
Montana	578	44	8	—	364	148	14
Nebraska	1,634	123	24	—	767	648	72
Nevada	66	—	—	—	5	52	9
New Hampshire	628	60	—	—	464	86	18
New Jersey	4,620	274	55	22	3,747	346	176
New Mexico	2,139	195	3	—	431	158	1,352
New York	21,430	1,533	234	—	14,073	4,246	1,344
North Carolina	4,084	589	30	16	2,649	758	42
North Dakota	742	71	15	70	481	23	82
Ohio	6,515	178	152	38	4,055	1,566	526
Oklahoma	2,869	208	14	—	1,756	590	301
Oregon	1,853	190	59	—	1,369	53	182
Pennsylvania	11,847	963	41	160	7,638	2,336	709
Rhode Island	428	74	16	—	53	240	45
South Carolina	1,635	211	7	—	1,066	338	13
South Dakota	1,339	80	5	—	500	271	483
Tennessee	2,493	274	35	—	1,460	704	20
Texas	7,231	437	218	21	4,716	1,514	325
Utah	724	120	—	—	133	21	460
Vermont	476	62	7	—	285	44	78
Virginia	2,362	337	23	7	1,499	463	33
Washington	850	227	37	34	296	253	3
West Virginia	762	161	28	—	282	122	169
Wisconsin	4,879	229	8	—	4,204	305	133
Wyoming	387	—	—	—	309	78	—

APPENDIX

List of Health Occupations

The occupations designated as "health occupations" and included in this list are restricted to those for which special education or training, designed to prepare the worker to function in a health setting, is usually required. There are some exceptions to this rule, notably in the areas of natural and social sciences, in order to include within disciplines that are not closely related to health the particular sub-specialties which are intimately concerned with health subject-matter. As a result of including these sub-specialties (such as estuarine oceanographer, limnologist, physical anthropologist), the list represents occupations that the health administrator must be concerned with when assembling staff to attack health problems. It is more inclusive than a list of occupations for which health authorities must assume responsibility for education.

About 125 occupations are identified by primary title. Also shown are approximately 250 alternate titles; these are synonyms, or designations related to form of practice, place of practice, or specialty.

An attempt has been made to standardize terminology in relation to level of training. Unless there is strong contrary convention, our usage is:

"Technologist" / "Therapist"	educational preparation at the baccalaureate level or above
"Technician" / "Assistant"	educational preparation at the associate degree level (2 years of college education or other formal preparation beyond high school)
"Aide"	specialized training of less than 2 years duration beyond high school, or on-the-job training

It is hoped that the primary occupational titles used here will have some influence on nomenclature in educational and training programs and also help the reader understand the relationship of occupations within the various health fields. Of course, job titles used in the health services industry do not conform to this or any other scheme or system. Titles indicating distinct levels of training or responsibility within a field are shown whenever it is known that planning or actual development of such a hierarchy is underway.

Although approximately 375 titles are listed, the inventory omits some workers within the health services industry. There are many business, clerical, and maintenance occupations that are essential but not unique to the industry, so that no special education or formal training for the health field is required. Among such occupations are accountants, admitting officers, business managers, cashiers, controllers, credit managers, directors of office services, employment interviewers, employment managers, housekeepers and housekeeping workers, job analysts, laundry managers and workers, maintenance workers, personnel directors and office workers, public relations directors, purchasing agents, stationary engineers, and stockroom managers.

The titles were compiled by the Division of Allied Health Manpower, Bureau of Health Professions Education and Manpower Training. An earlier version of this list appears as an appendix to HEALTH RESOURCES STATISTICS, 1968 (PHS Pub. No. 1509, 1968 edition).

The health occupations have been grouped into 32 fields, instead of the 35 that appear in the manpower chapters (pt. I) of *Health Resources Statistics, 1969*. In addition, there is not complete correspondence between the occupations and chapter headings that appear in this list and the text.

LIST OF HEALTH OCCUPATIONS

Primary title (1)	*Alternate title*
1. ADMINISTRATION:	
Health administrator	Health officer or commissioner.
	Environmental control administrator.
	Health agency executive director.
	Health care administrator.
	Hospital administrator.
	Medical care administrator.
	Nursing home administrator.
	Public health administrator.
Health administrative assistant	
Health program analyst	Public health analyst.
	Public health specialist.
Health program representative	Public health advisor.
	Public health representative.
Health systems analyst	
2. BIOMEDICAL ENGINEERING:	
Biomedical engineer	Bioengineer.
	Medical engineer.
Biomedical engineering technician	Medical engineering technician.
Biomedical engineering aide	
3. CHIROPRACTIC AND NATUROPATHY:	
Chiropractor	Doctor of chiropractic.
Naturopath	Naturopathic physician.
4. CLINICAL LABORATORY SERVICES (*2*):	
Clinical laboratory scientist (*3*)	Clinical chemist (*3*).
	Microbiologist (*3*).
Clinical laboratory technologist	Medical laboratory technologist.
	Medical technologist.
	Blood banking technologist.
	Chemistry technologist.
	Hematology technologist.
	Microbiology technologist.
Clinical laboratory technician	Medical laboratory technician.
	Medical technician.
	Cytotechnician.
	Cytotechnologist.
Clinical laboratory aide	Laboratory assistant.
	Certified laboratory assistant.
	Histologic aide.
	Histologic technician.
	Pathology laboratory aide.
5. DENTISTRY AND ALLIED SERVICES:	
Dentist	Endodontist.
	Oral pathologist.
	Oral surgeon.
	Orthodontist.
	Pedodontist.
	Periodontist.
	Prosthodontist.
	Public health dentist.
Dental hygienist	
Dental assistant	
Dental laboratory technician	Dental laboratory assistant.

LIST OF HEALTH OCCUPATIONS—Continued

Primary title (1)	*Alternate title*
6. DIETETIC AND NUTRITIONAL SERVICES:	
Dietitian	Administrative dietitian.
	Consultant (public health) dietitian.
	Research dietitian.
	Teaching dietitian.
	Therapeutic dietitian.
Nutritionist (3)	Public health nutritionist.
Dietary technician	Dietary (food service) assistant.
	Food service manager.
	Food service technician.
Dietary aide	Dietary (food service) worker.
Food service supervisor	
7. ENVIRONMENTAL CONTROL (4):	
Environmental scientist (3)	Sanitary sciences specialist (3).
	Air pollution meteorologist (3).
	Environmental control chemist (3).
	Estuarine oceanographer (3).
	Ground water hydrologist (3).
	Health physicist (3).
	Limnologist (3).
Environmental engineer	Sanitary engineer.
	Air pollution engineer.
	Hospital engineer.
	Industrial hygiene engineer.
	Public health engineer.
	Radiological health engineer.
Environmental technologist	Sanitarian.
	Air pollution specialist.
	Industrial hygienist.
	Radiological health specialist.
Environmental technician	Sanitarian technician.
	Environmental engineering technician.
	Radiological health technician (monitor).
Environmental aide	Sanitarian aide.
	Environmental engineering aide.
	Sewage plant assistant.
	Waterworks assistant.
8. FOOD AND DRUG PROTECTIVE SERVICES:	
Food technologist	
Food and drug inspector	
Food and drug analyst	
Food and drug technician	
9. HEALTH EDUCATION:	
Health educator	Community health educator.
	Public health educator.
	School health coordinator.
	School health educator.
Health education aide	
10. INFORMATION AND COMMUNICATION:	
Health information specialist	Biomedical communication specialist.
Health science writer	Medical writer.
Health technical writer	Medical technical writer.
	Medical editor.
Medical illustrator	Medical photographer.
11. LIBRARY SERVICES:	
Medical librarian	
Medical library assistant	
Hospital librarian	Patients' librarian.

LIST OF HEALTH OCCUPATIONS—Continued

Primary title (1)	*Alternate title*
12. MATHEMATICAL SCIENCES (4):	
Mathematician	Biomathematician. Demographer.
Statistician	Biostatistician. Health statistician. Vital record registrar.
13. MEDICAL RECORDS:	
Medical record librarian	Medical record specialist. Medical record technologist.
Medical record technician	Medical record assistant.
Medical record clerk	Medical record aide.
14. MEDICINE AND OSTEOPATHY:	
Physician	Doctor of Medicine—M.D.
Osteopathic physician	Doctor of Osteopathy—D.O.
M.D. or D.O.	Allergist. Anesthesiologist. Aviation medicine specialist. Cardiovascular disease specialist. Colon and rectal surgeon (proctologist). Dermatologist. Forensic pathologist. Gastroenterologist. General practitioner. Gynecologist. Internist. Manipulative therapy specialist. Neurological surgeon. Neurologist. Occupational medicine specialist. Obstetrician. Ophthalmologist. Orthopedic surgeon. Otolaryngologist (otorhinolaryngologist). Pathologist. Pediatrician (5). Physiatrist (physical medicine and rehabilitation specialist). Plastic surgeon. Preventive medicine specialist. Psychiatrist (6). Public health physician. Pulmonary disease specialist. Radiologist (7). Surgeon. Thoracic surgeon. Urologist.
	Intern. Resident. Fellow.
15. MIDWIFERY:	
Midwife	Lay midwife. Nurse midwife (8).

LIST OF HEALTH OCCUPATIONS—Continued

Primary title (1)	*Alternate title*
15. NATURAL SCIENCES (4):	
Anatomist	Cytologist. Embryologist. Histologist.
Botanist	
Chemist	Bioanalyst. Biochemist. Clinical chemist (9). Environmental control chemist (10).
Ecologist	
Entomologist	
Epidemiologist	
Geneticist	
Hydrologist	Ground water hydrologist (10).
Immunologist	
Meteorologist	Air pollution meteorologist (10).
Microbiologist (9)	Bacteriologist. Mycologist. Parasitologist. Virologist.
Nutritionist (11)	
Oceangrapher	Estuarine oceanographer (10).
Pathologist	
Pharmacologist	Toxicologist.
Physicist	Biophysicist. Health physicist (10).
Physiologist	
Sanitary sciences specialist (10)	
Zoologist	Limnologist (10).
17. NURSING AND RELATED SERVICES:	
Nurse	Registered nurse—R.N. Graduate nurse. Professional nurse. Hospital nurse. Occupational health (industrial) nurse. Office nurse. Private duty nurse. Public health nurse. School nurse. Nurse anesthetist. Nurse midwife (12). Obstetrical nurse. Pediatric nurse. Psychiatric nurse. Surgical (operating room) nurse.
Practical nurse	Licensed practical nurse. Vocational nurse. Licensed vocational nurse.
Nursing aide Orderly Attendant	Nursing assistant.
Home health aide	Psychiatric (mental health) aide. Home aide—homemaker. Visiting health aide.
Ward clerk	Floor clerk.
18. OCCUPATIONAL THERAPY:	
Occupational therapist	
Occupational therapy asistant	Occupational therapy technician.
Occupational therapy aide	

LIST OF HEALTH OCCUPATIONS—Continued

Primary title (1)	*Alternate title*
19. ORTHOTIC AND PROSTHETIC TECHNOLOGY:	
Orthotist	Orthopedic brace maker.
Orthotic aide	
Prosthetist	Artificial limb maker.
Prosthetic aide	
Restoration technician	
20. PHARMACY:	
Pharmacist	Community pharmacist.
	Hospital pharmacist.
	Industrial pharmacist.
Pharmacy aide	Pharmacy helper.
21. PHYSICAL THERAPY:	
Physical therapist	
Physical therapy assistant	Physical therapy technician.
Physical therapy aide	
22. PODIATRIC MEDICINE:	
Podiatrist	Chiropodist.
	Foot orthopedist.
	Foot roentgenologist.
	Podiatric surgeon.
	Pododermatologist.
23. RADIOLOGIC TECHNOLOGY:	
Radiologic technologist	
Radiologic technician	X-ray technician.
	Radiation therapy technician.
24. SECRETARIAL AND OFFICE SERVICES (4):	
Secretary	Dental secretary.
	Medical secretary.
Office assistant	Dentist's office assistant.
	Medical assistant.
	Optometrist's office assistant.
	Physician's office assistant.
25. SOCIAL SCIENCES (4):	
Anthropologist	Cultural (social) anthropologist.
	Physical anthropologist.
Economist	Health economist.
Psychologist	Clinical psychologist.
	Counseling psychologist.
	Measurement psychologist (psychometrist).
	Social psychologist.
Sociologist	Medical sociologist.
26. SOCIAL WORK:	
Clinical social worker	Medical social worker.
	Psychiatric social worker.
Clinical social work assistant	
Clinical social work aide	Clinical casework aide.
27. SPECIALIZED REHABILITATION SERVICES:	
Corrective therapist	
Corrective therapy aide	
Educational therapist	
Manual arts therapist	
Music therapist	
Recreation therapist	Therapeutic recreation specialist.
Recreation therapy aide	
Homemaking rehabilitation consultant	
28. SPEECH PATHOLOGY AND AUDIOLOGY:	
Audiologist	Hearing therapist.
Speech pathologist	Speech therapist.

LIST OF HEALTH OCCUPATIONS—Continued

Primary title (1)	*Alternate title*
29. VETERINARY MEDICINE:	
Veterinarian	Laboratory (animal medicine) veterinarian. Public health veterinarian. Veterinary laboratory diagnostician. Veterinary microbiologist. Veterinary pathologist. Veterinary radiologist. Veterinary surgeon. Veterinary toxicologist.
Veterinary technician	Animal technician.
30. VISION CARE AND SERVICES:	
Ophthalmologist (*18*)	
Optometrist	
Vision care technologist	Ocular care technologist. Ophthalmic technologist. Optometric technologist.
Technician:	
Vision care technician	Ocular care technician. Ophthalmic technician (assistant). Optometric technician (assistant).
Orthoptic technician	Orthoptist.
Optician	Dispensing optician. Ophthalmic dispenser (optical fitter). Contact lens technician. Lens grinder-polisher (*14*). Optical (laboratory) mechanic.
Vision care aide	Ocular care aide. Ophthalmic aide. Optometric aide. Visual training aide.
31. VOCATIONAL REHABILITATION COUNSELING:	
Vocational rehabilitation counselor	Rehabilitation counselor.
32. MISCELLANEOUS HEALTH SERVICES:	
Assistance for physicians:	
Physician's associate (*15*)	Child health associate. Pediatric associate.
Physician's assistant	Anesthetic assistant. Orthopedic assistant.
Physician's aide	Obstetrical aide. Pediatric aide. Surgical aide.
Emergency health service:	
Medical emergency technician	
Ambulance attendant (aide)	
Inhalation therapy:	
Inhalation therapist	Inhalation therapy technician.
Inhalation therapy aide	
Medical machine technology:	
Cardiopulmonary technician	
Electrocardiograph technician	
Electroencephalograph technician	
Other	Biomedical instrument technician.
Nuclear medicine:	
Nuclear medical technologist	
Nuclear medical technician	

LIST OF HEALTH OCCUPATIONS—Continued

Primary title (1)	*Alternate title*
Other health services:	
Community health aide	Dental health aide. Mental health aide (worker). School health aide.
Extracorporeal circulation specialist	
Other	

REFERENCES

(1) The occupations listed are those which make a significant contribution to the health field and for which individuals have developed specialized competence.
(2) Includes pathology laboratory.
(3) See Natural Sciences.
(4) For some of the occupations listed, only a minority of the workers may be engaged in health related work.
(5) Includes specialists in pediatric allergy and cardiology.
(6) Includes specialists in child psychiatry.
(7) Includes specialists in diagnostic and therapeutic radiology.
(8) See Nursing and Related Services.
(9) See Clinical Laboratory Services.
(10) See Environmental Health Activities.
(11) See Dietetic and Nutritional Services.
(12) See Midwifery.
(13) See Medicine and Osteopathy.
(14) Also known as assembler, benchman, edger, or surfacer; optical technician or shopman,
(15) Baccalaureate or higher educational background.

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☆ U.S. GOVERNMENT PRINTING OFFICE: 1970 O—377-758